Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

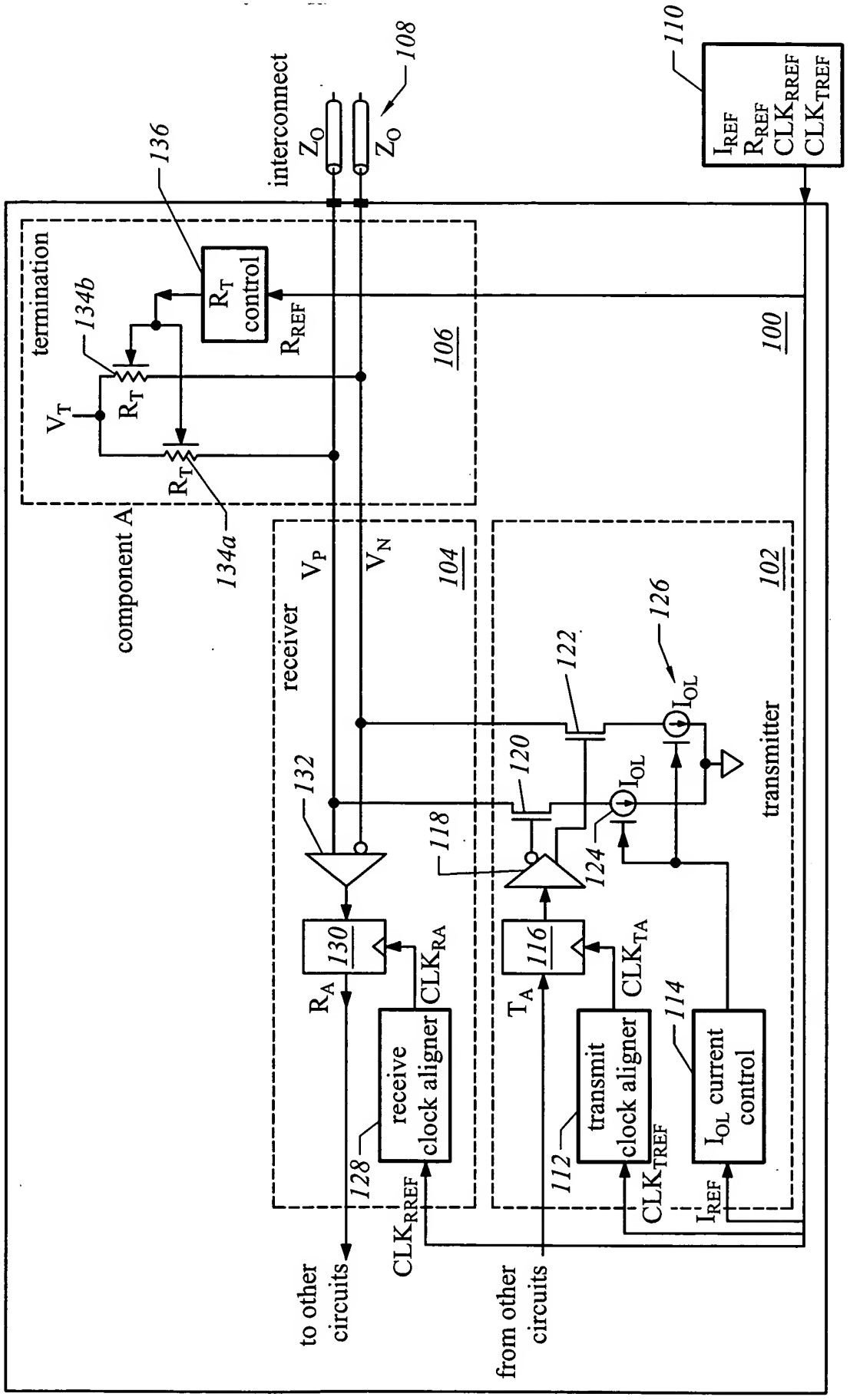


FIG. 1

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

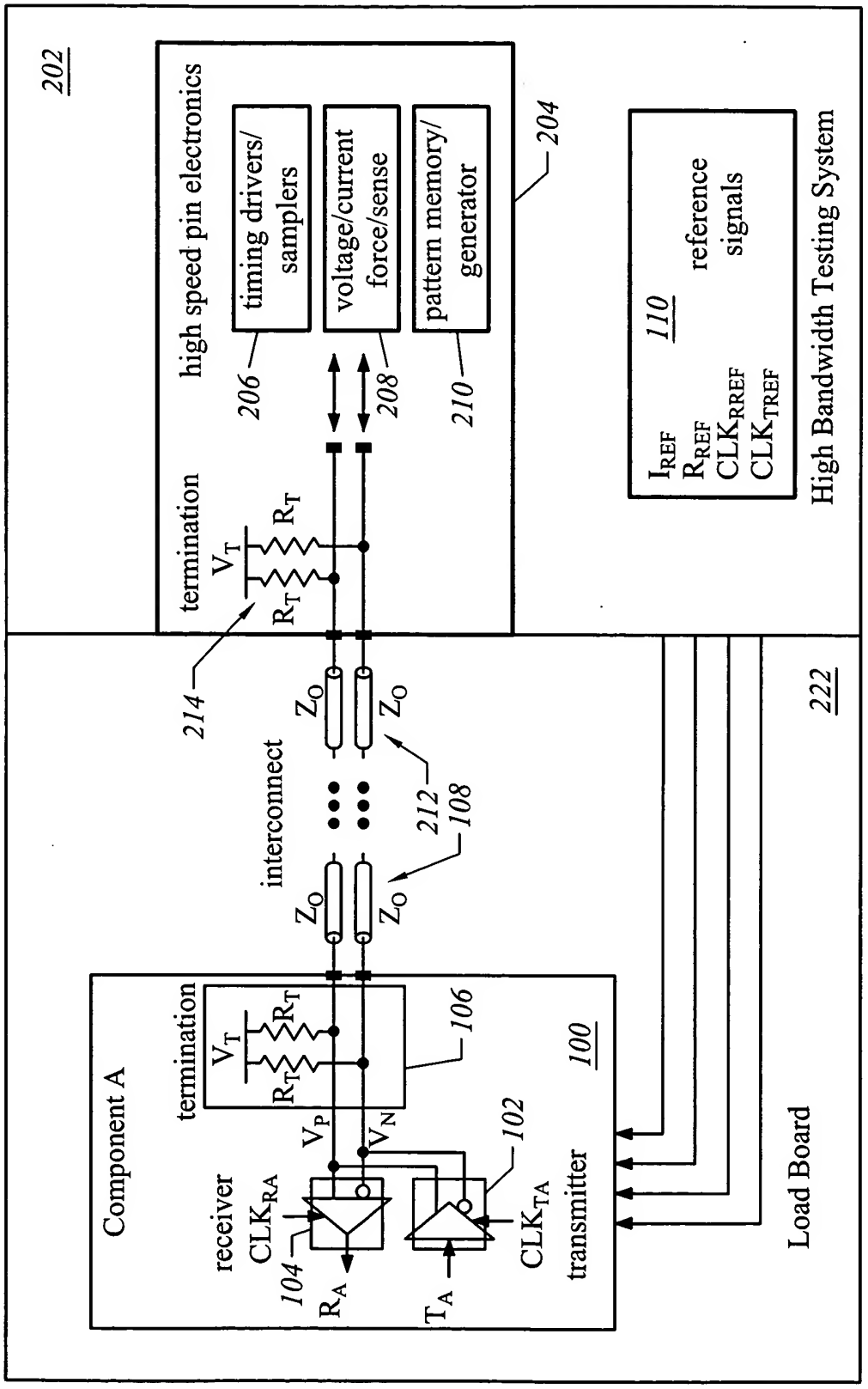


FIG. 2

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

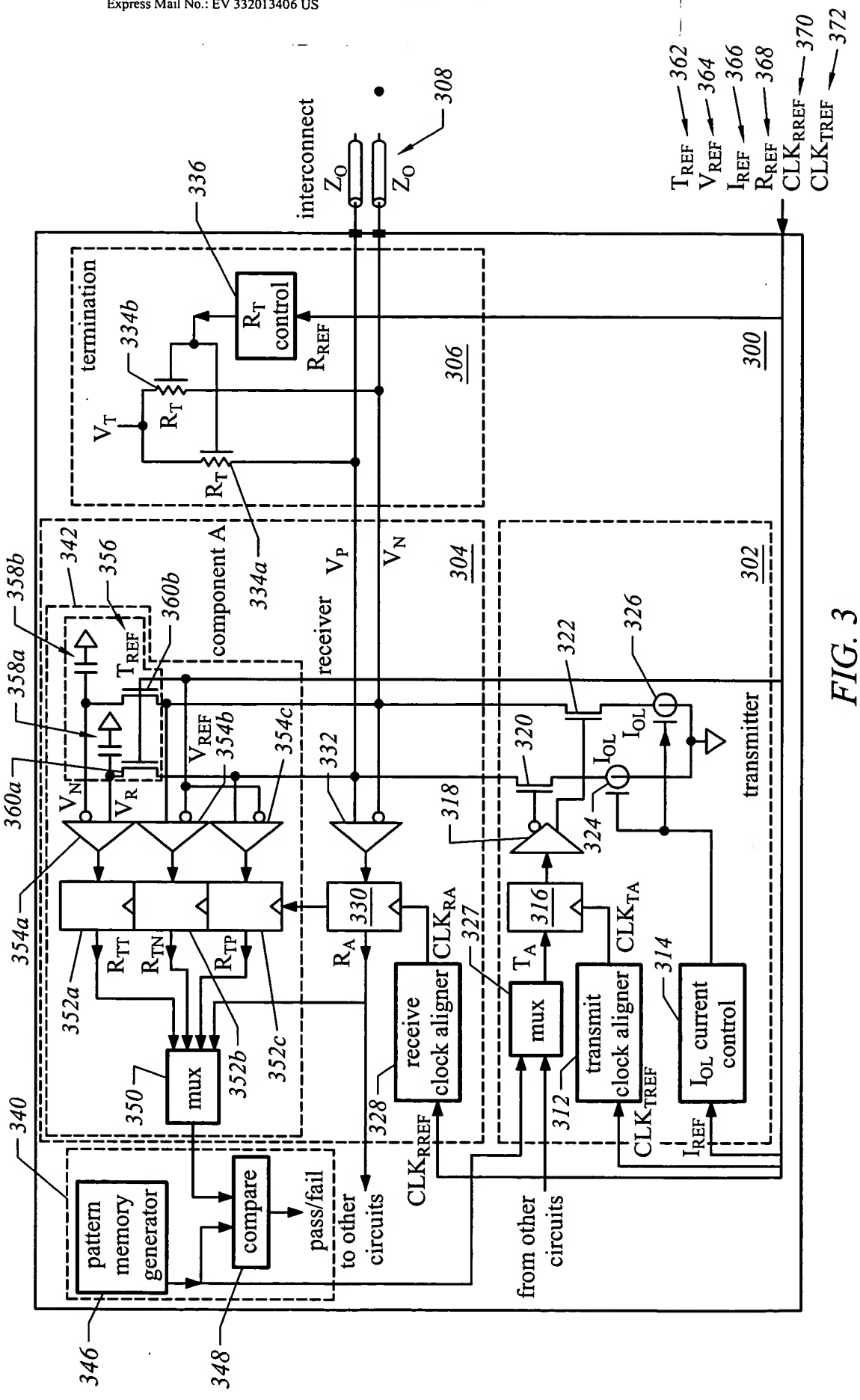


FIG. 3

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

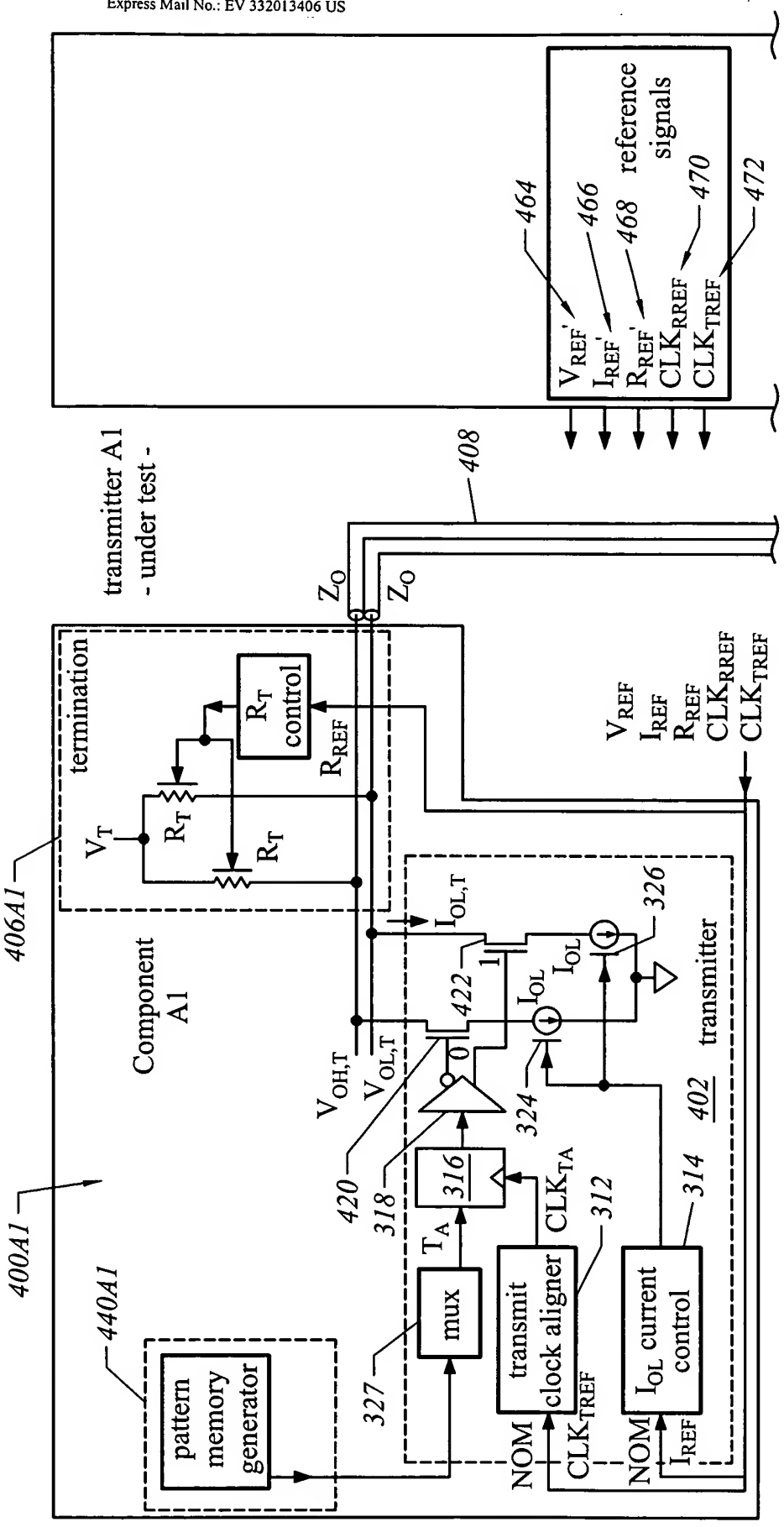


FIG. 4A

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

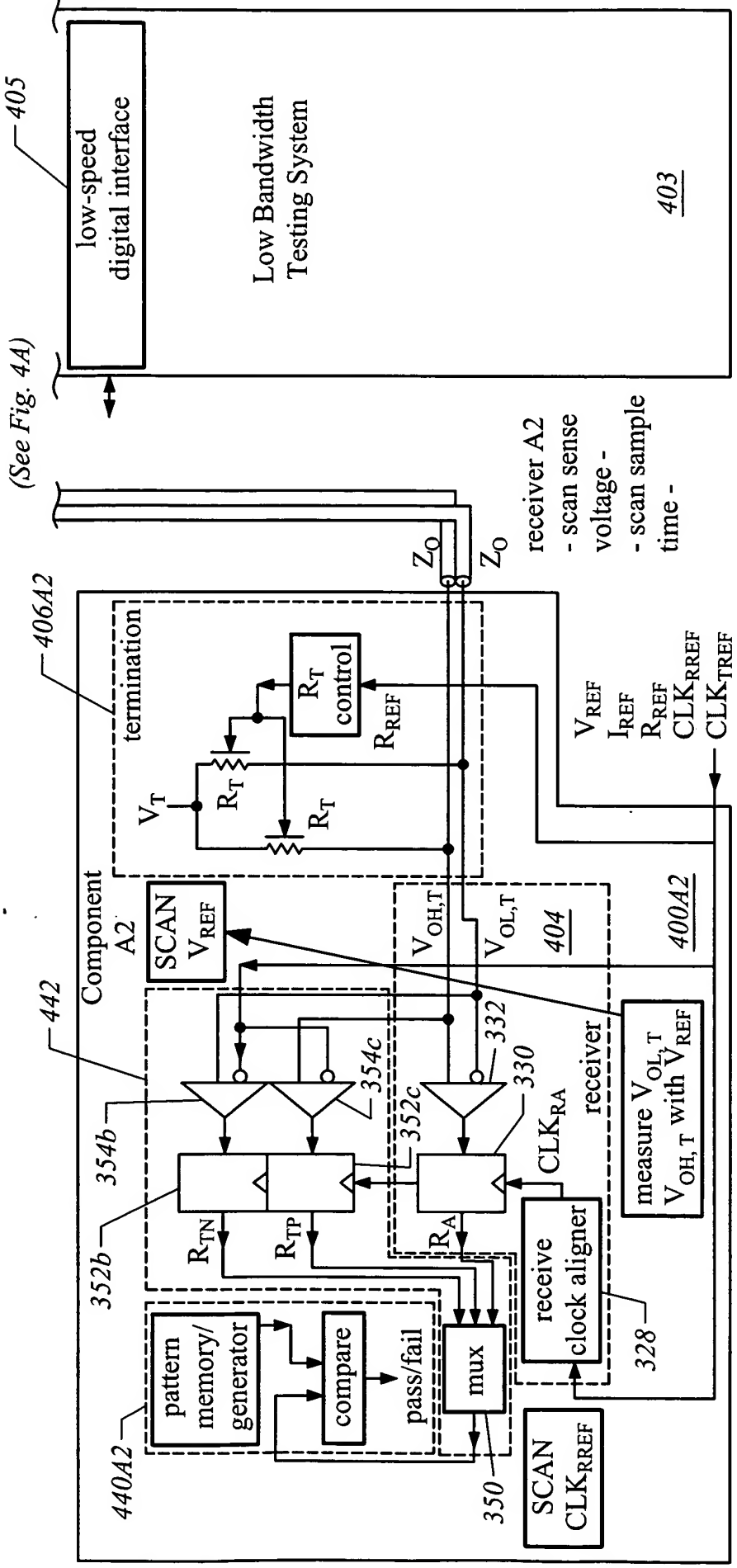


FIG. 4B

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

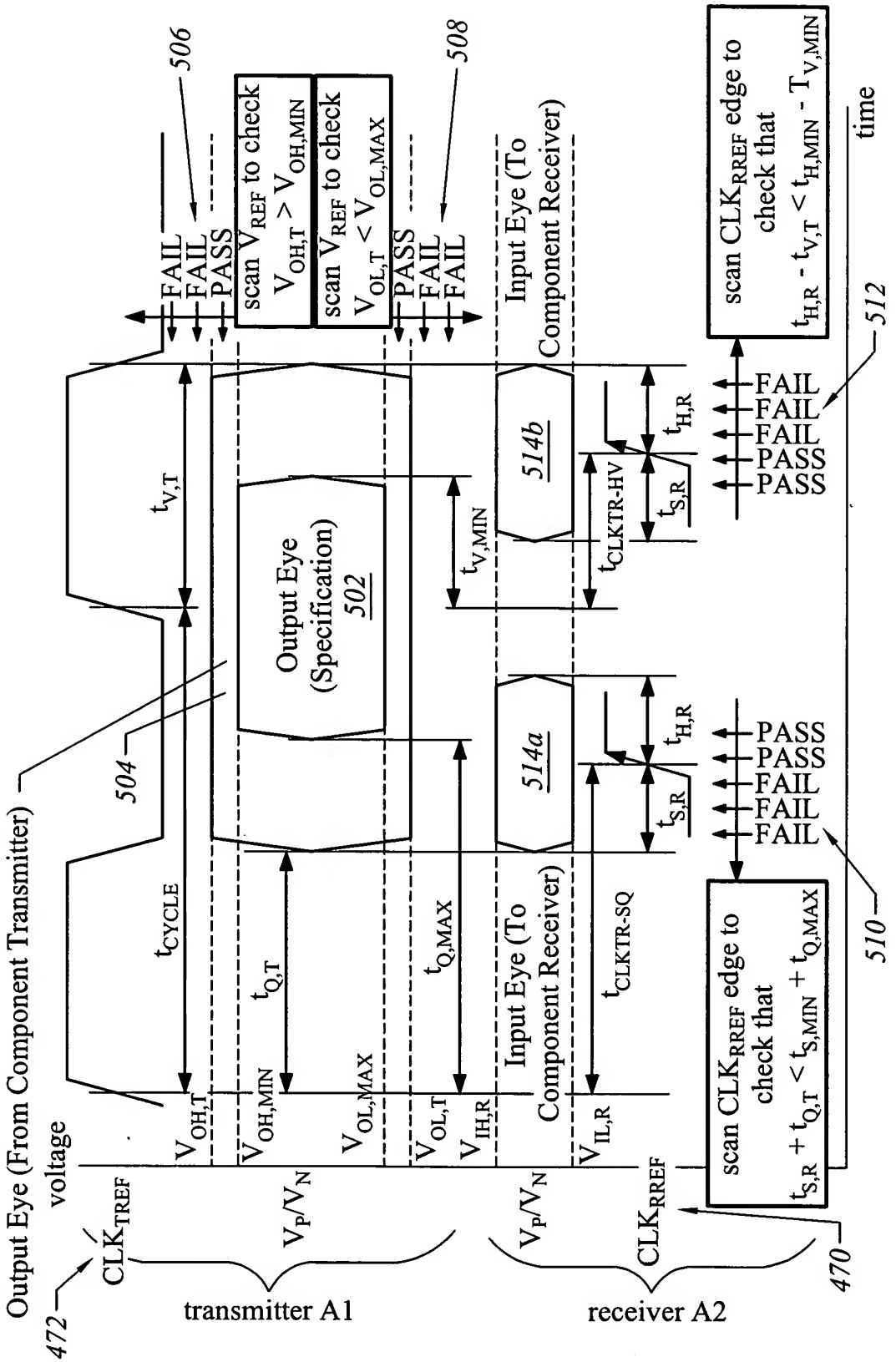


FIG. 5

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

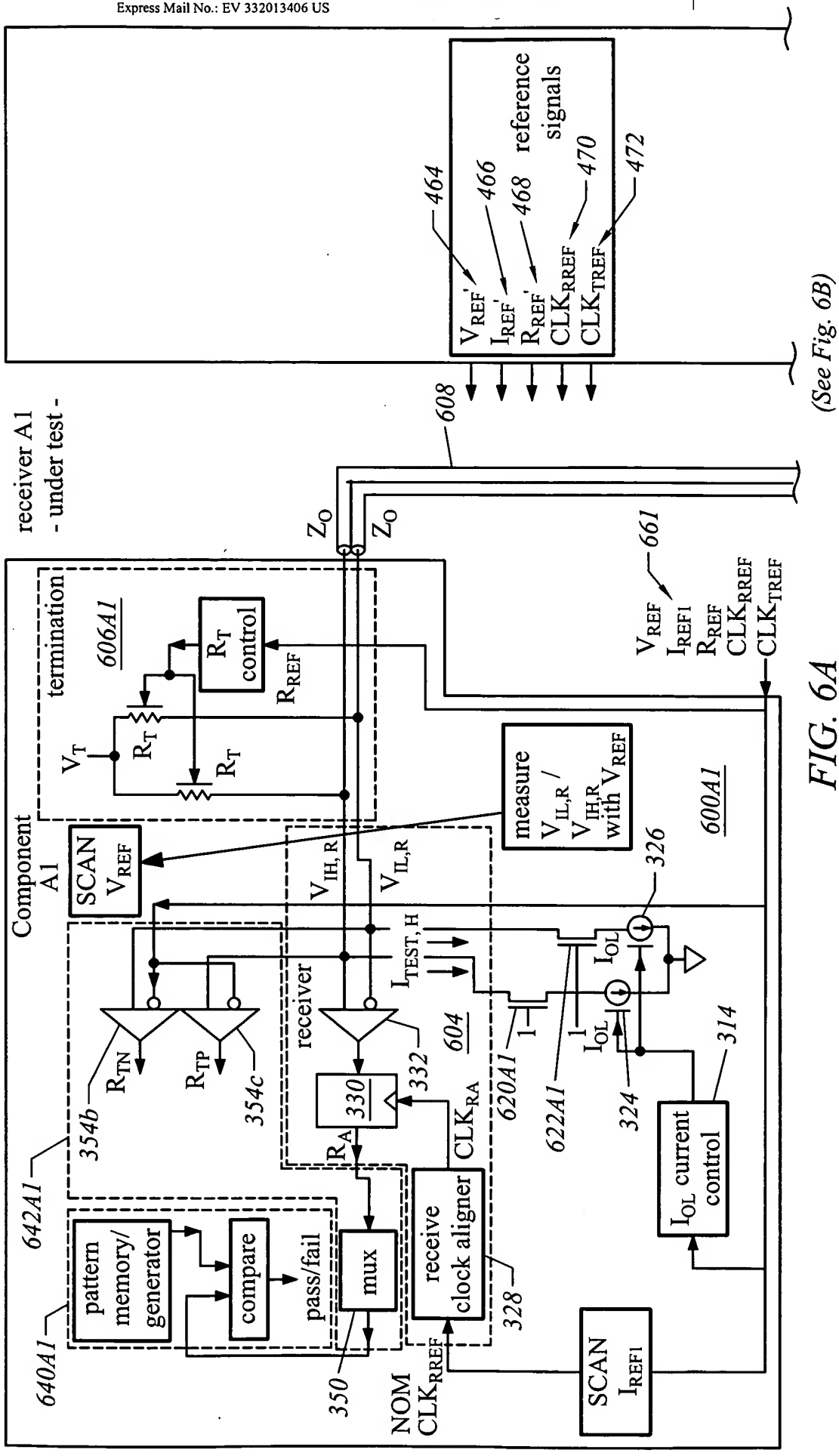


FIG. 6A

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

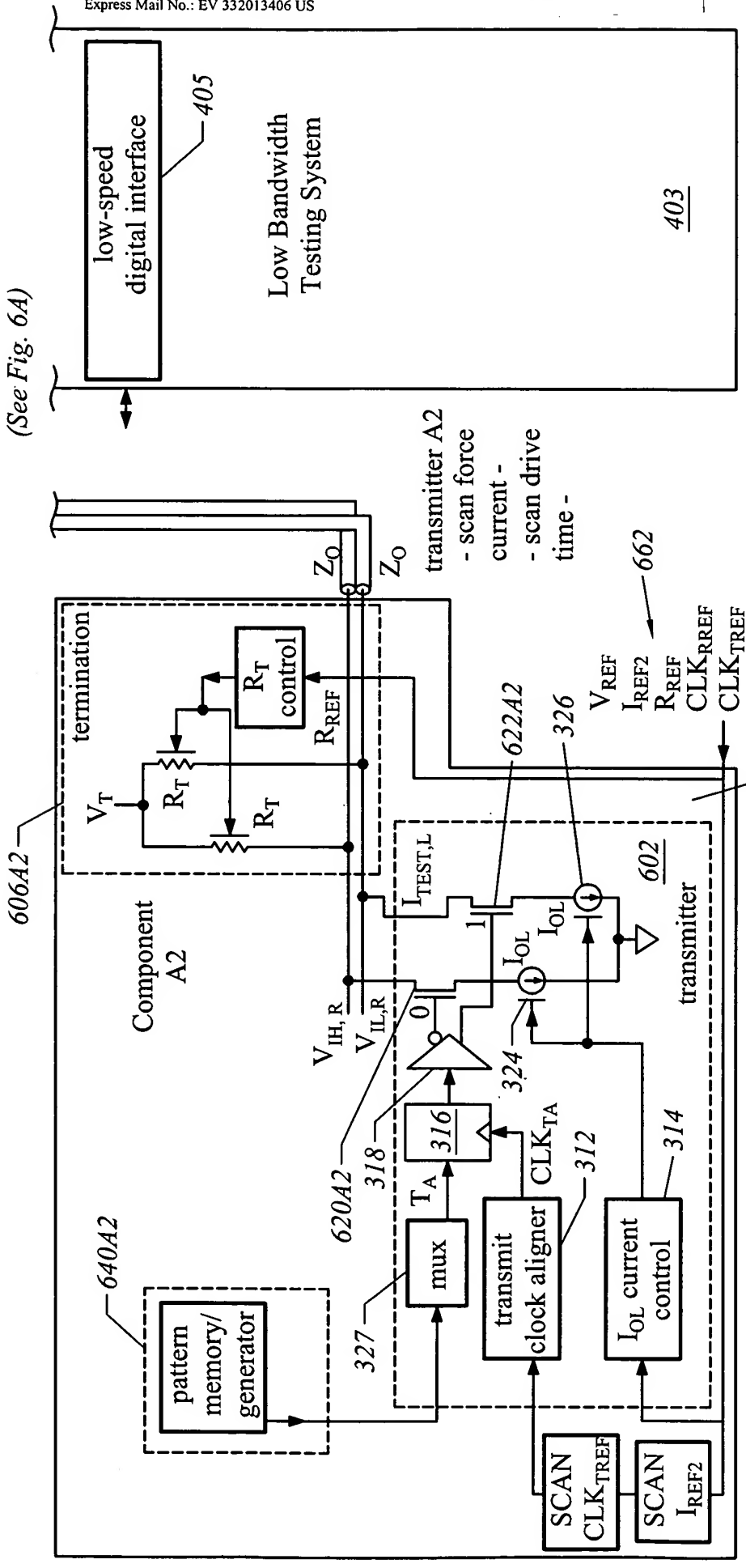


FIG. 6B

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

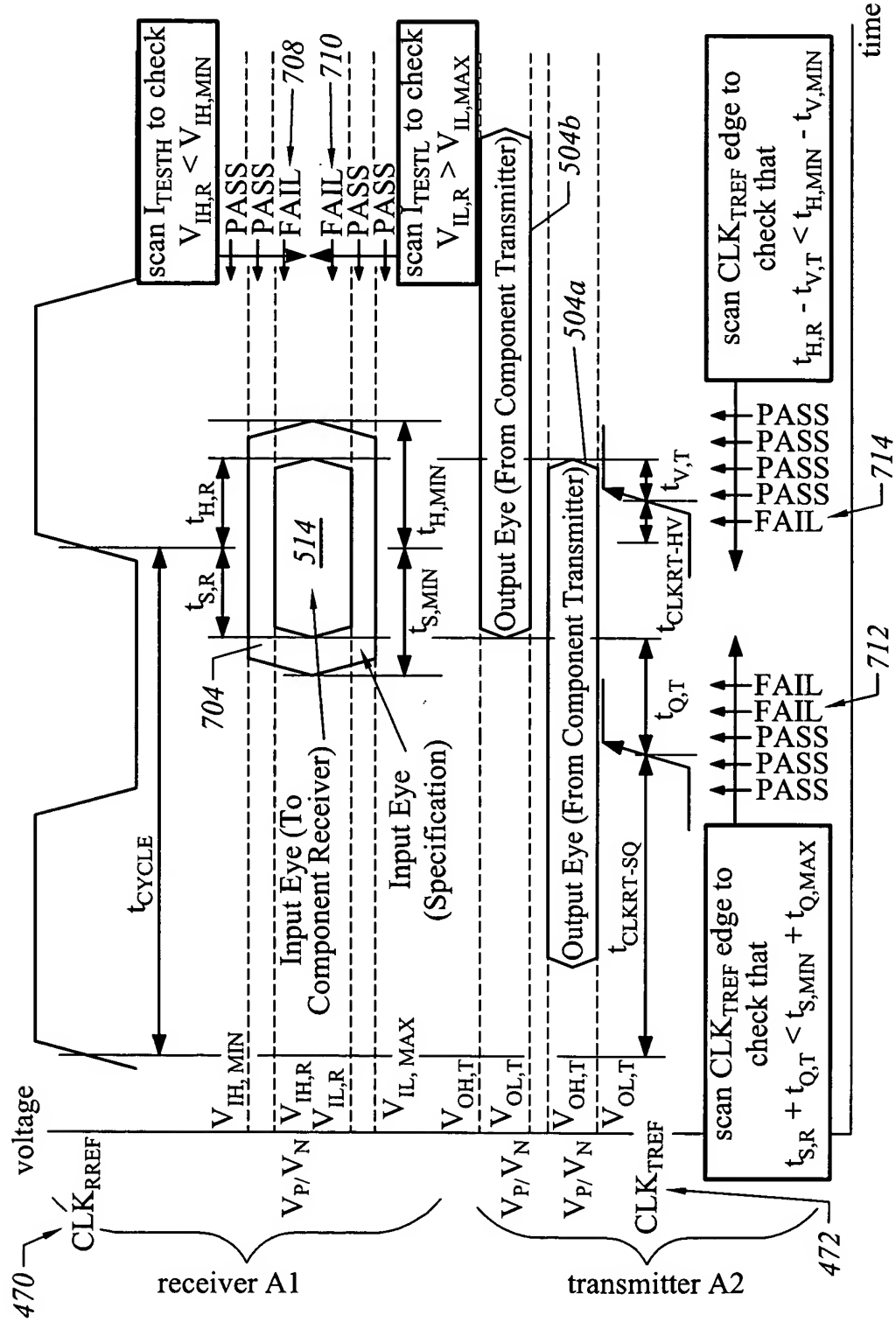


FIG. 7

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

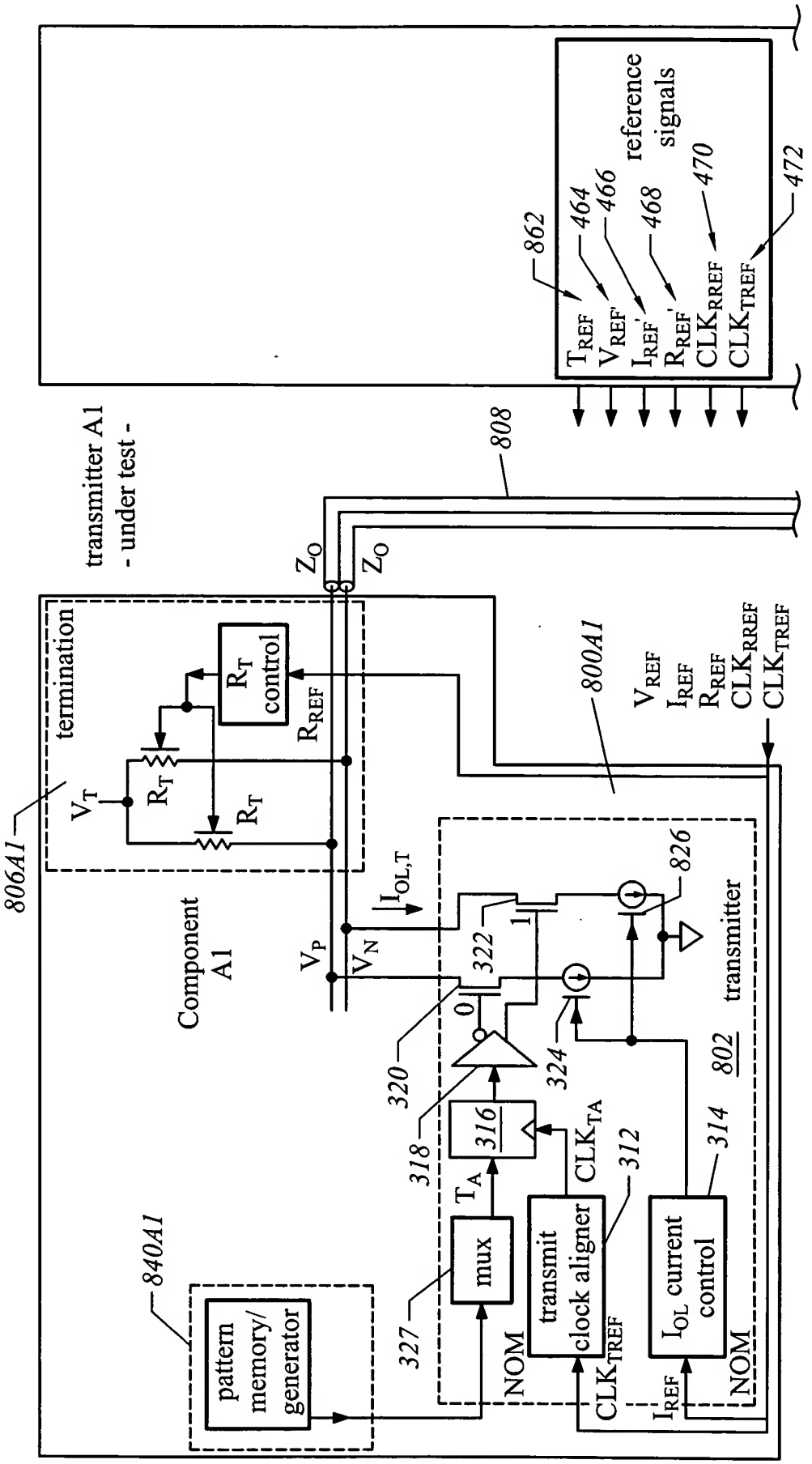


FIG. 8A

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

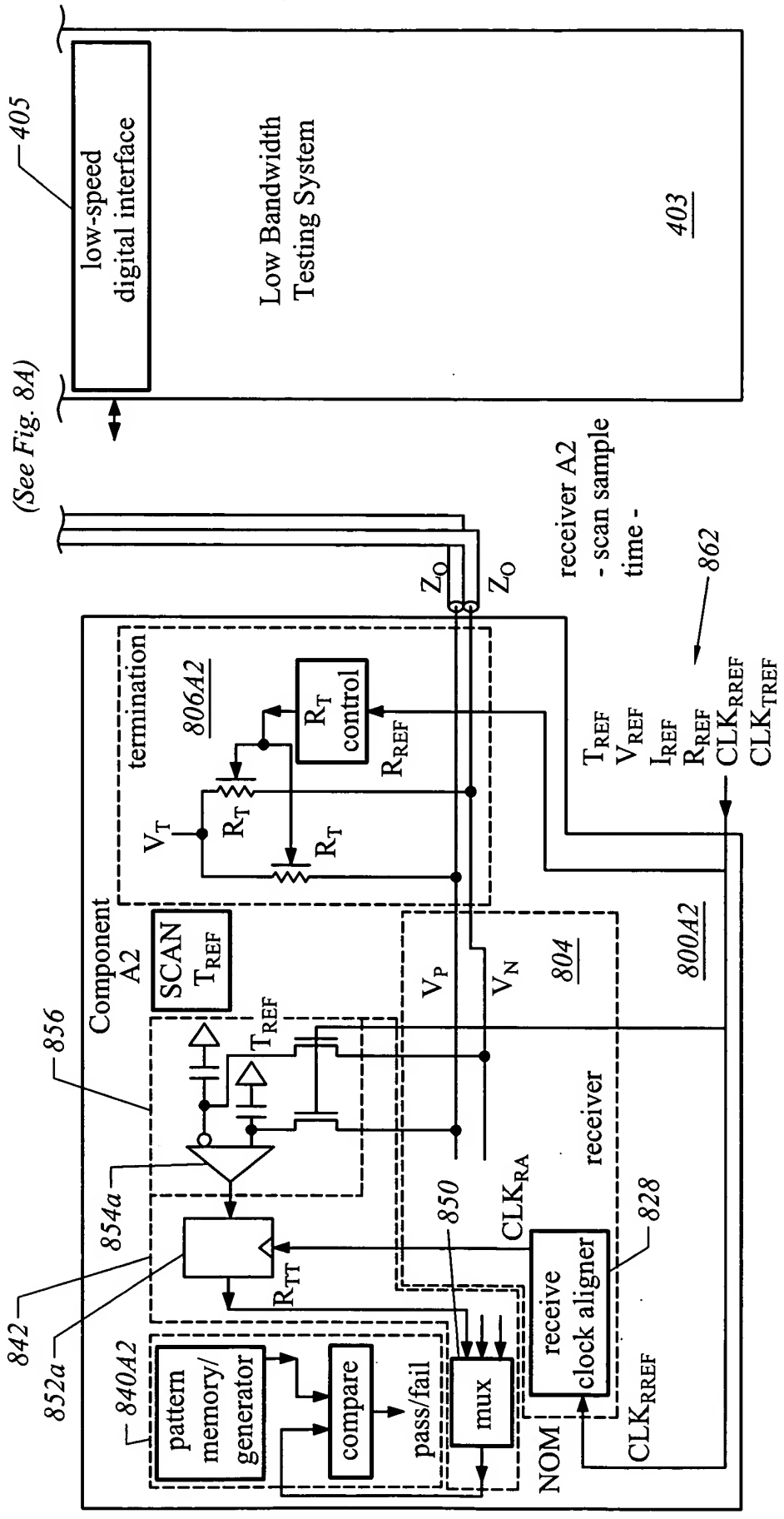


FIG. 8B

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

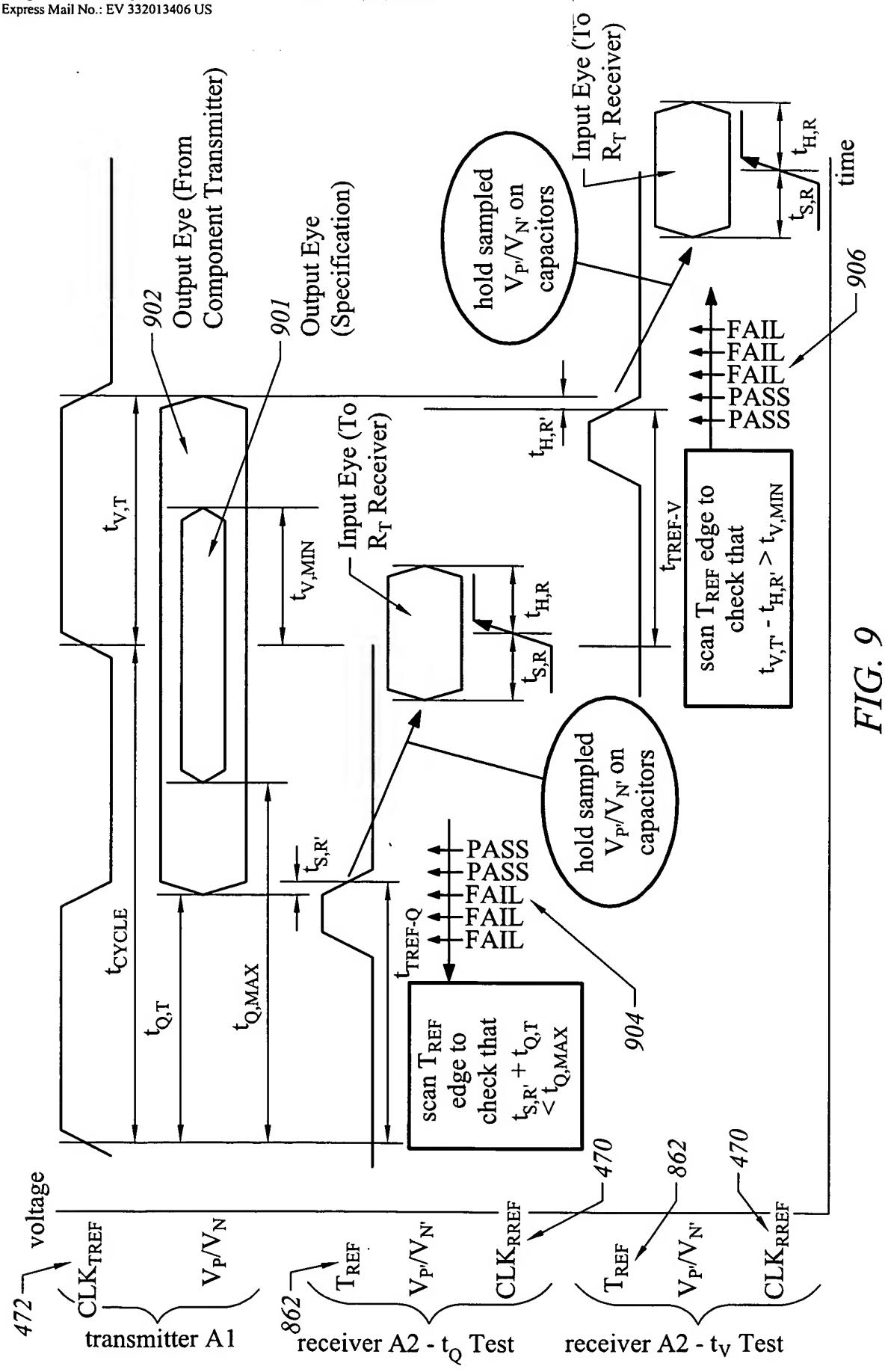


FIG. 9

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

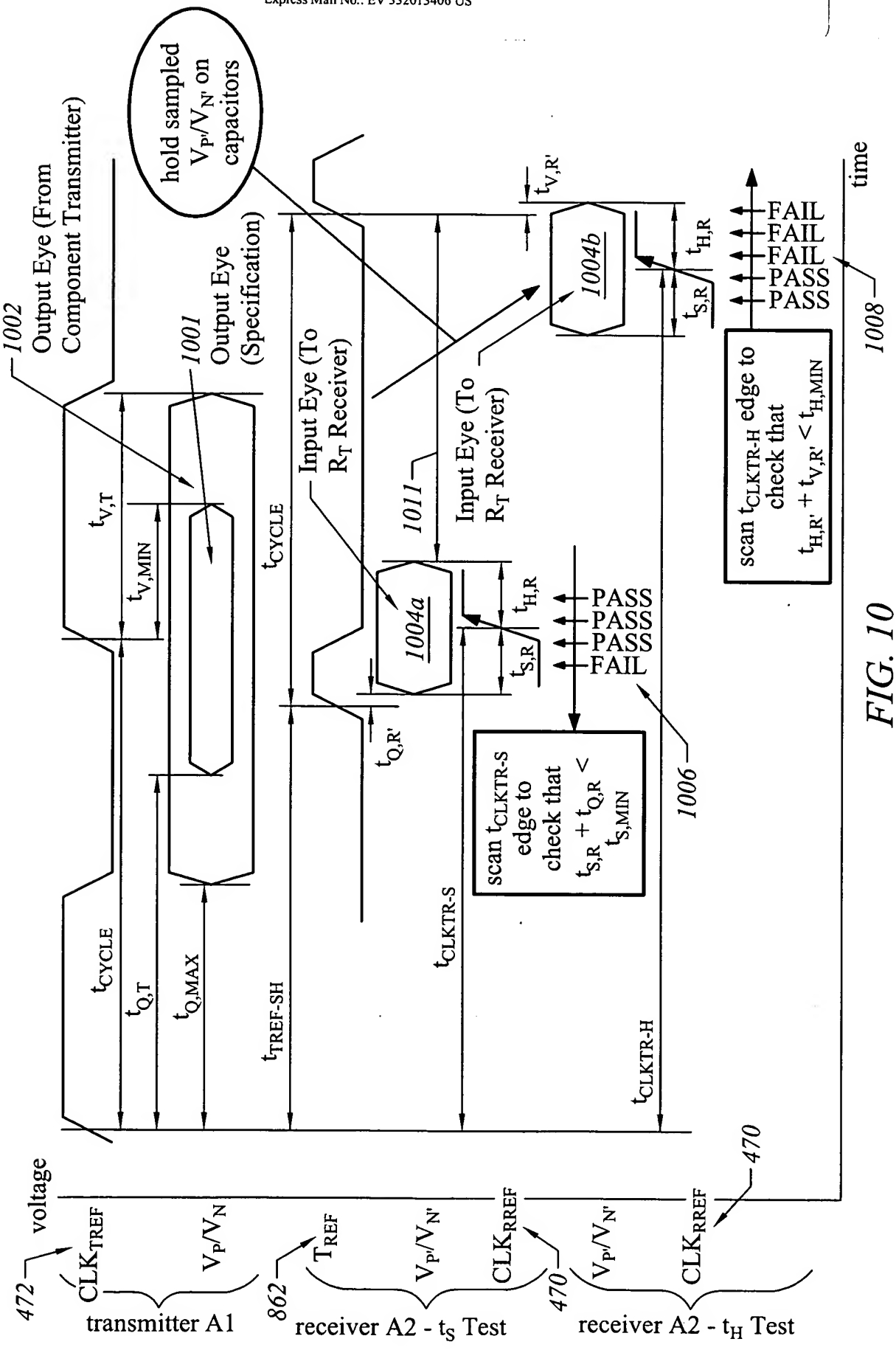


FIG. 10

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

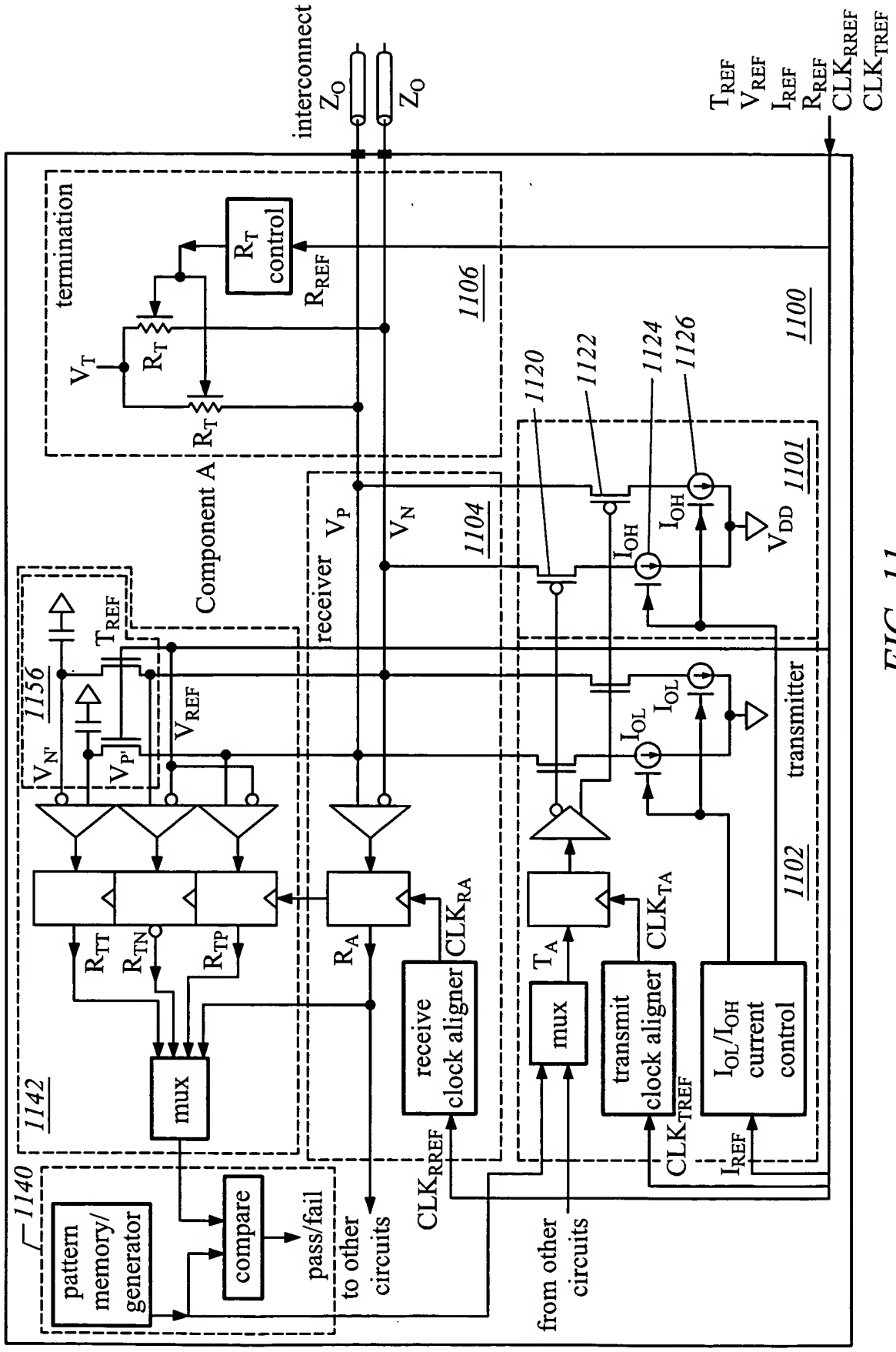


FIG. 11

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

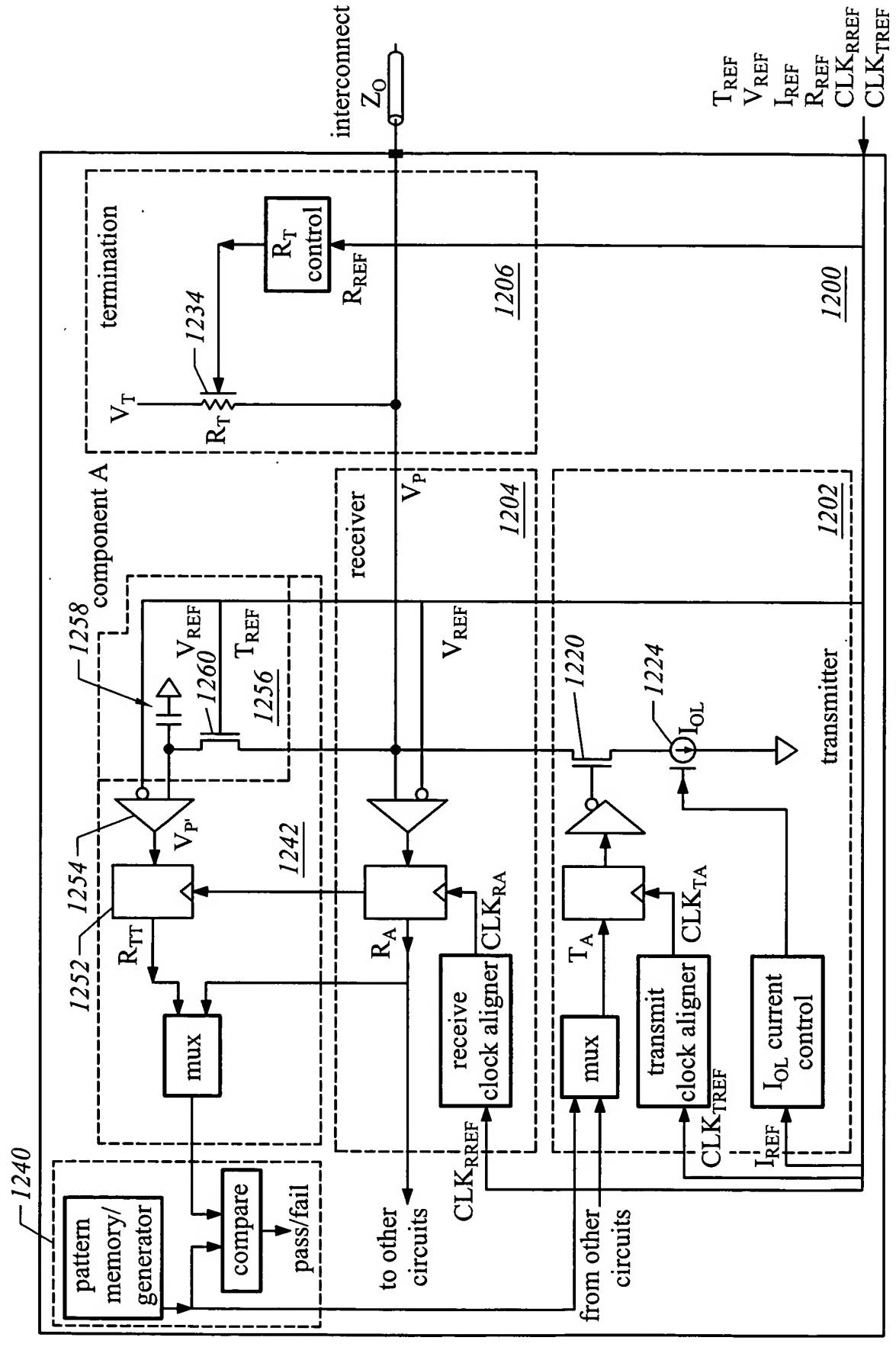
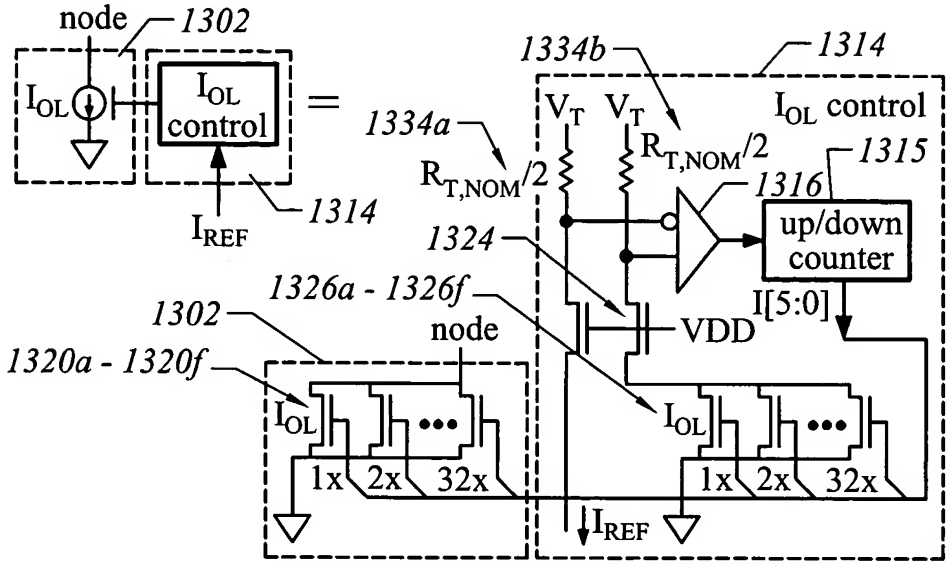


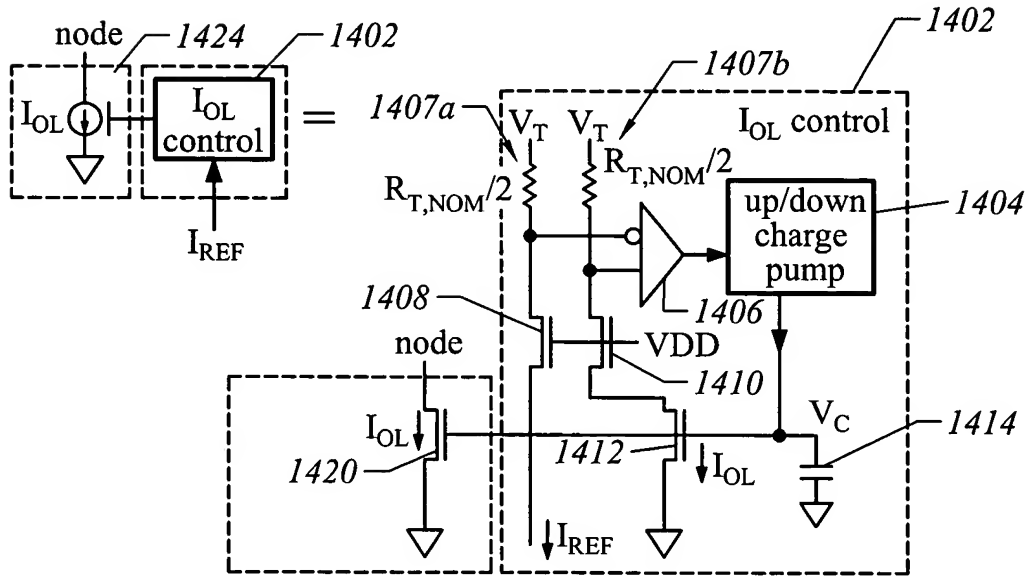
FIG. 12

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US



I_{OL} current calibration to reference value

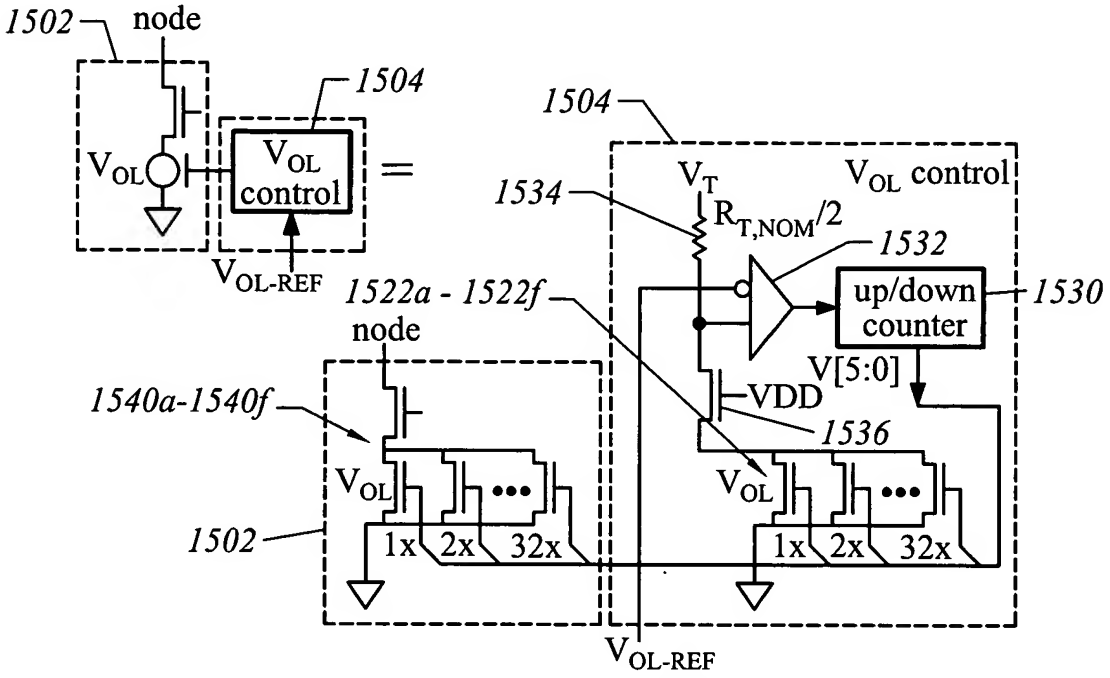
FIG. 13



I_{OL} current calibration to reference value with analog control voltage

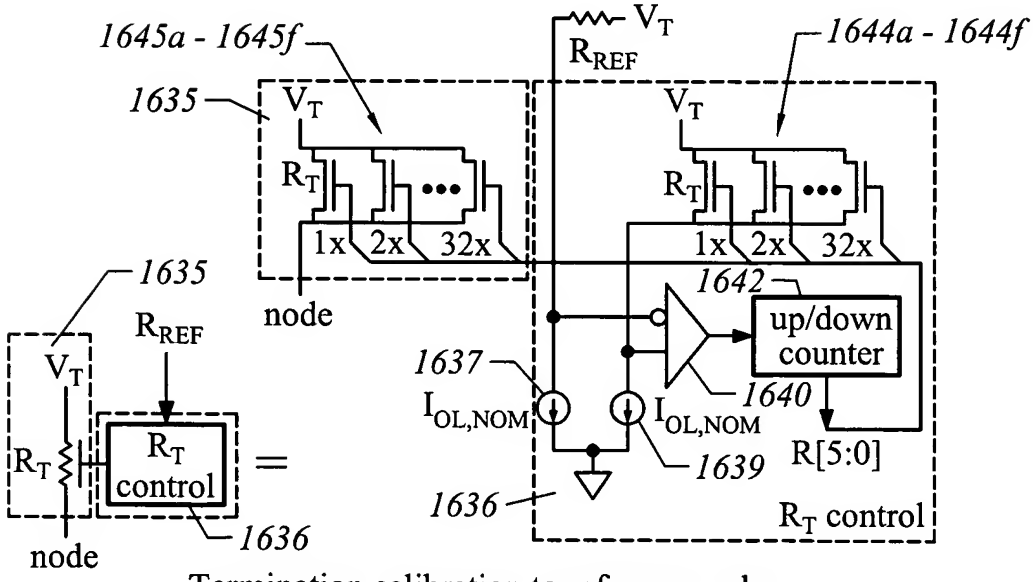
FIG. 14

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US



V_{OL} voltage calibration to reference value

FIG. 15



Termination calibration to reference value

FIG. 16

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

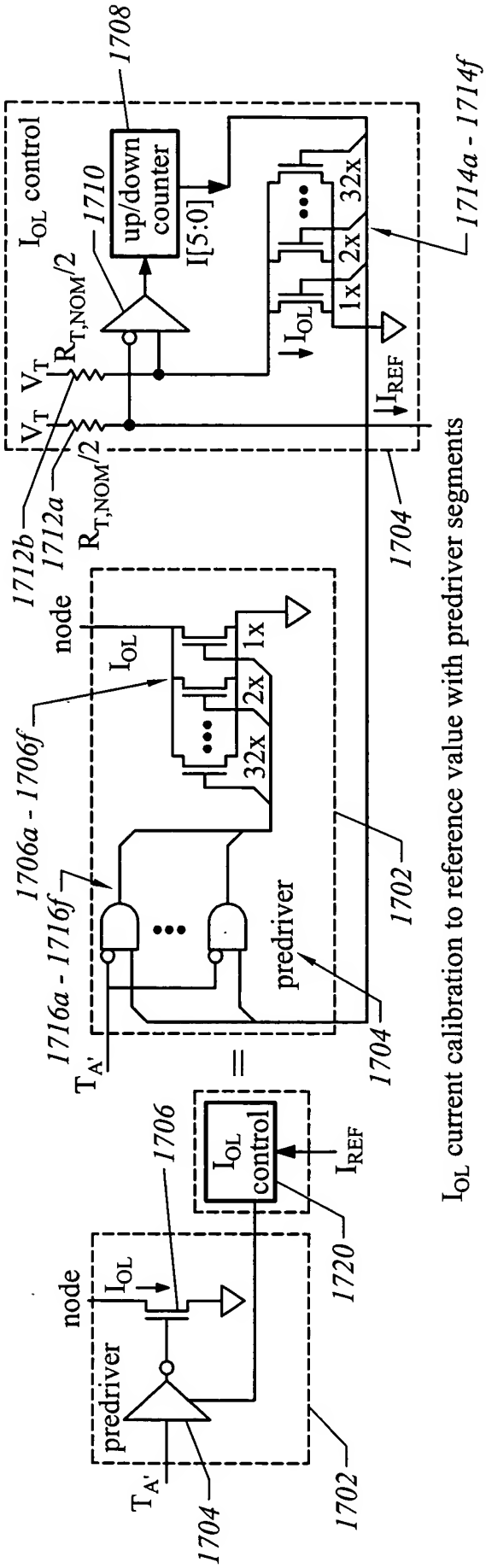


FIG. 17

I_{OL} current calibration to reference value with predriver segments

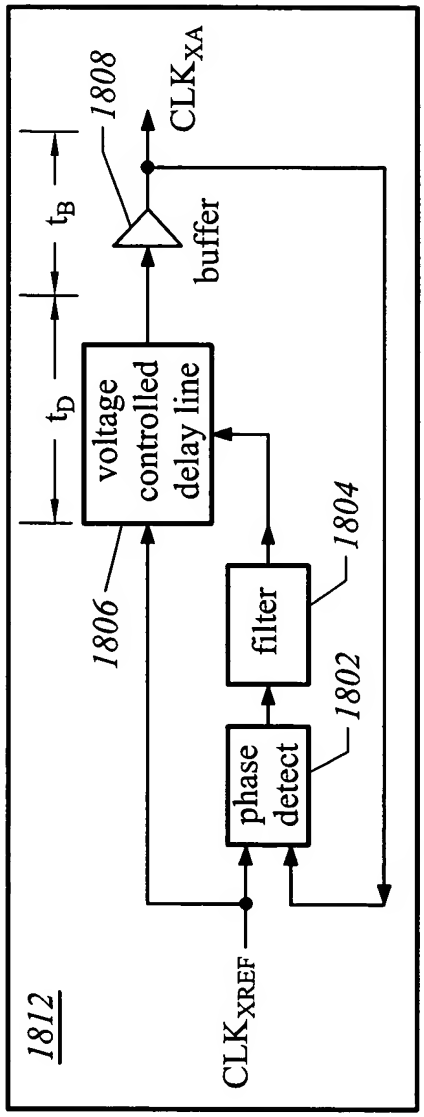
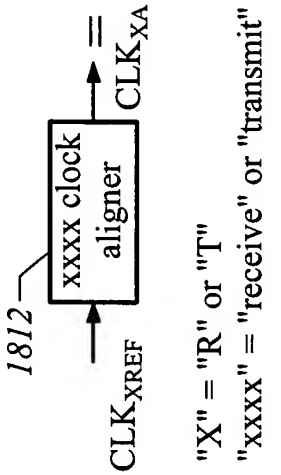
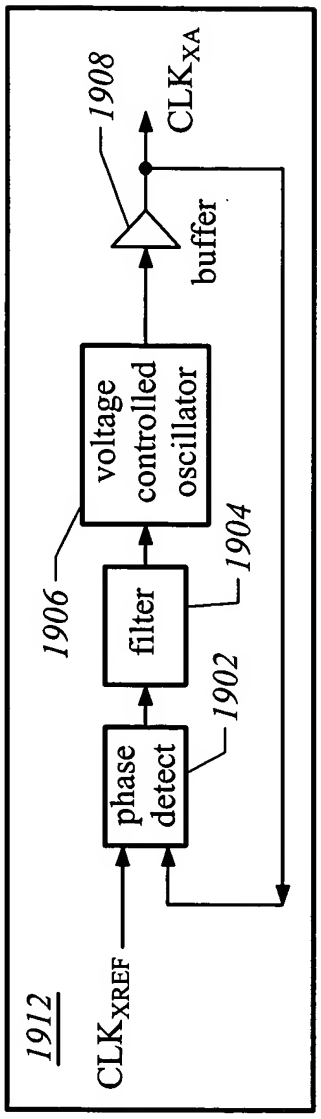


FIG. 18



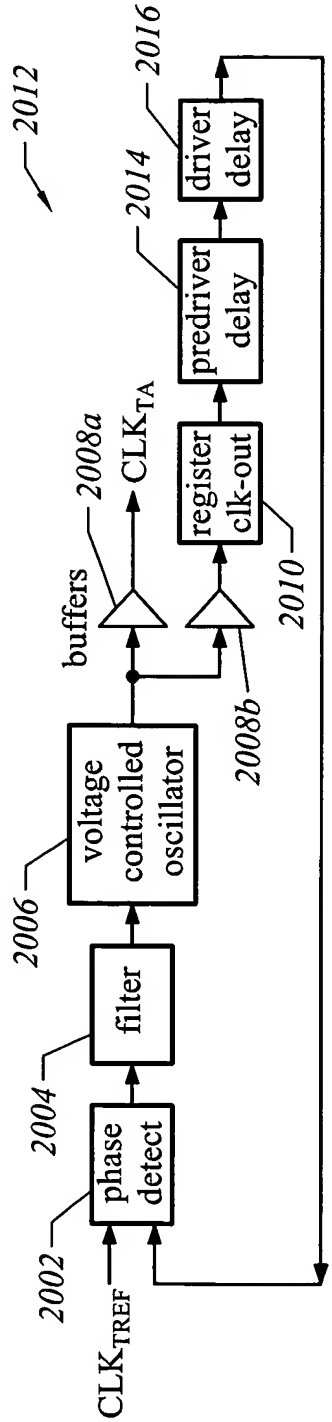
"X" = "R" or "T"
"XXXX" = "receive" or "transmit"

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US



Receive or transmit clock alignment using PLL (phase-locked-loop)

FIG. 19



Transmitter clock aligner with output register/predriver/driver loop compensation

FIG. 20

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

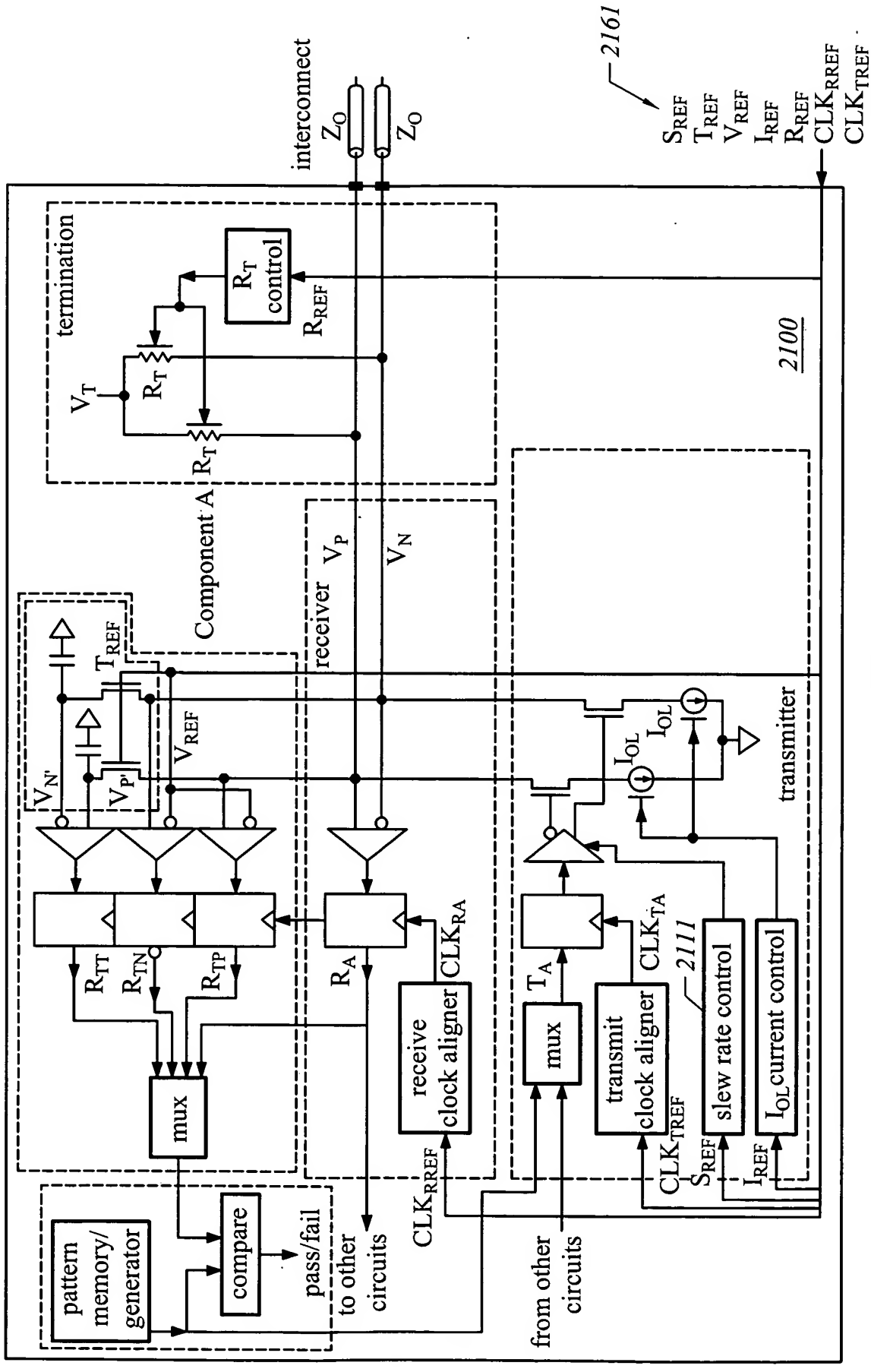


FIG. 21

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

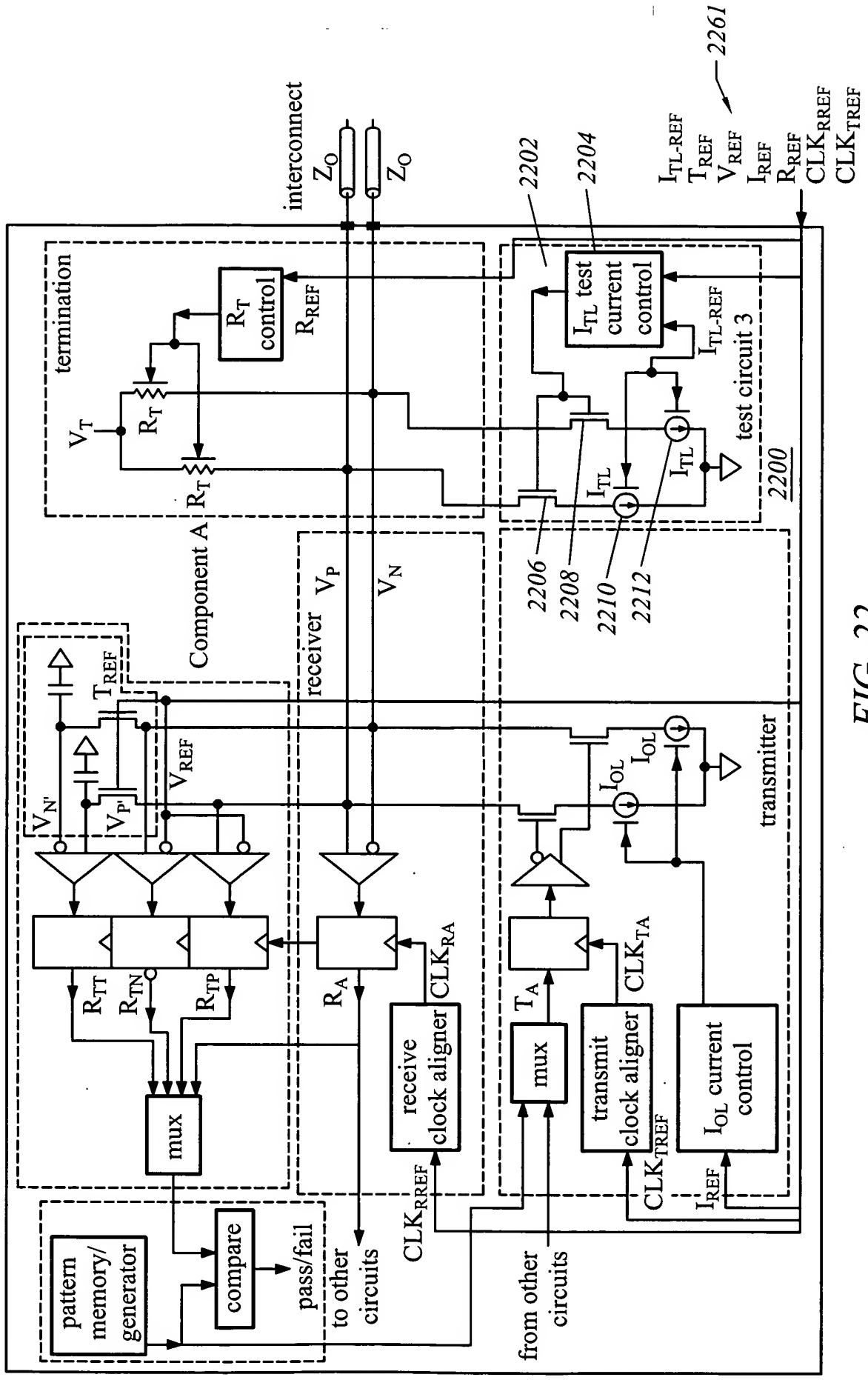
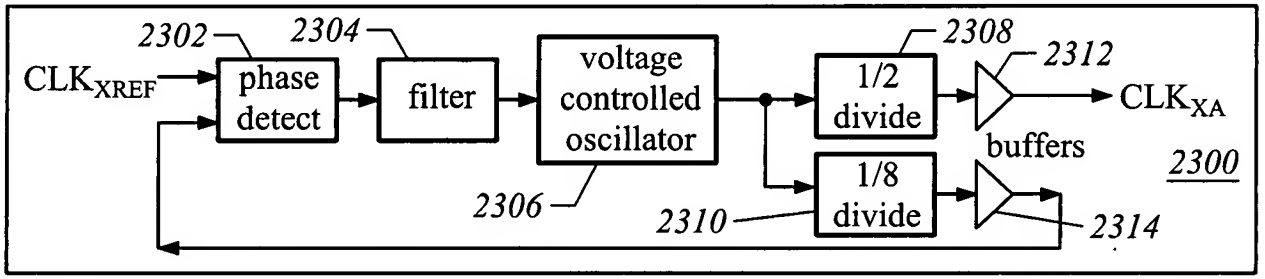


FIG. 22

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US



Receive or transmit clock alignment using PLL with 4x frequency multiplication

FIG. 23A

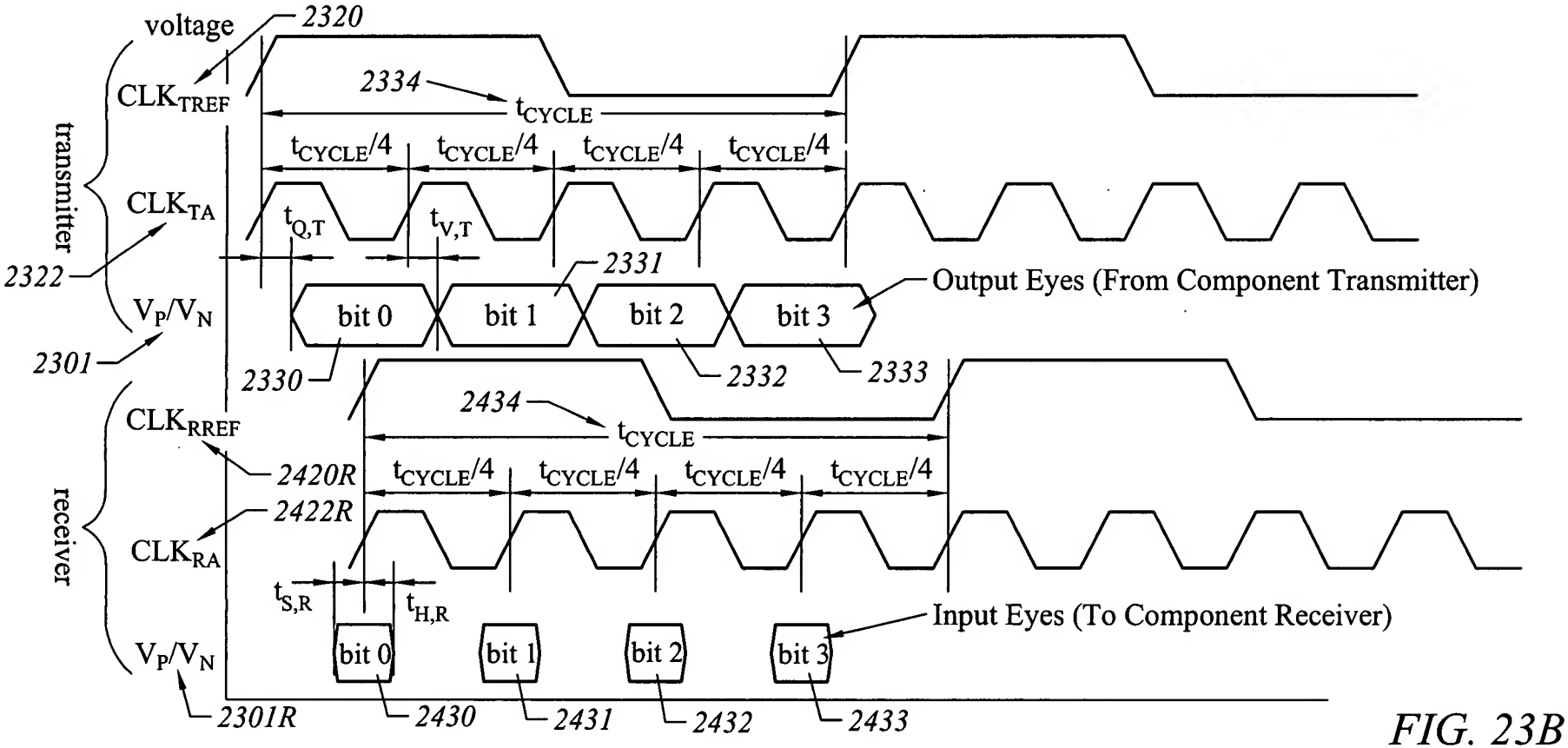


FIG. 23B

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

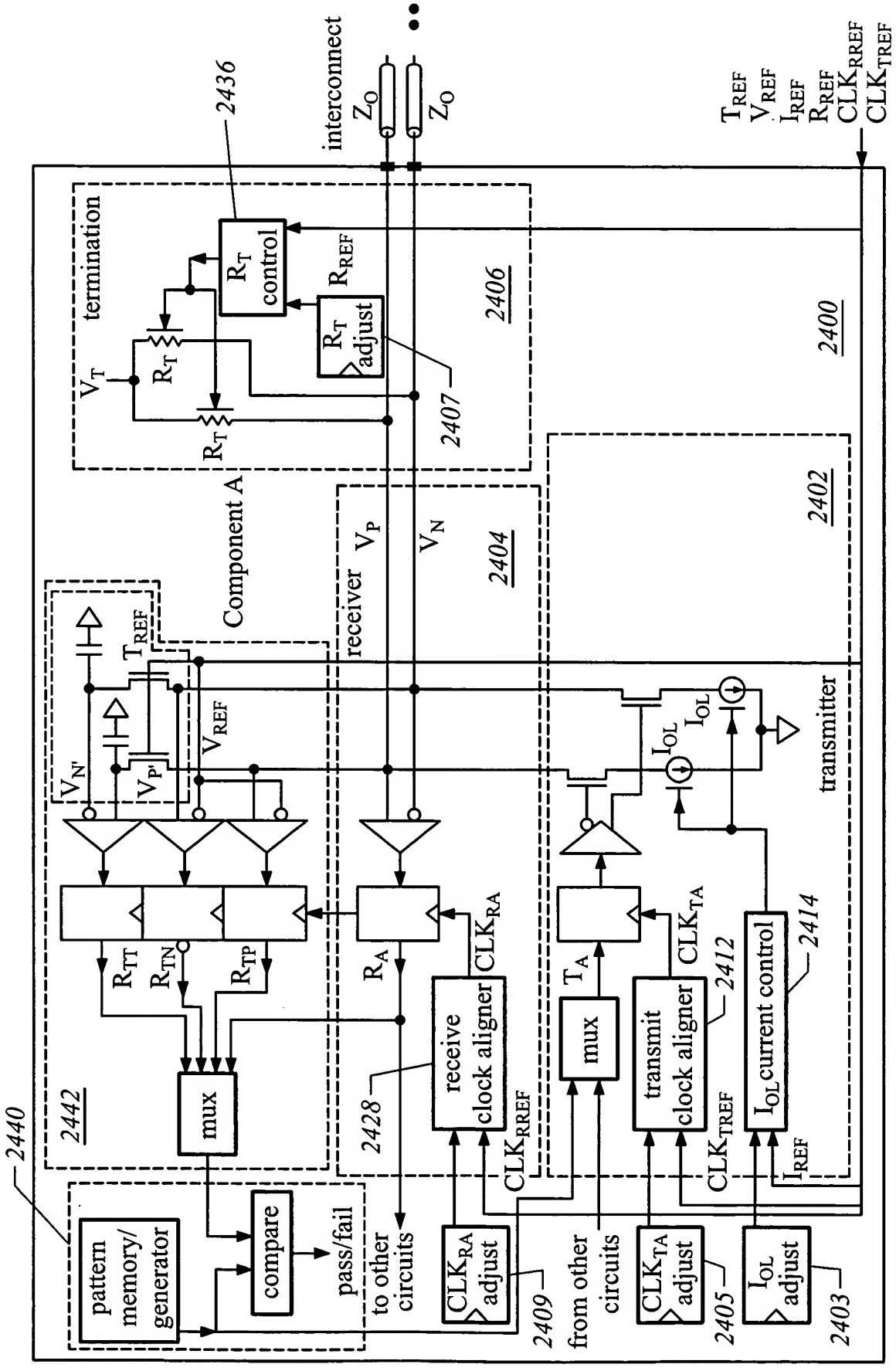


FIG. 24

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

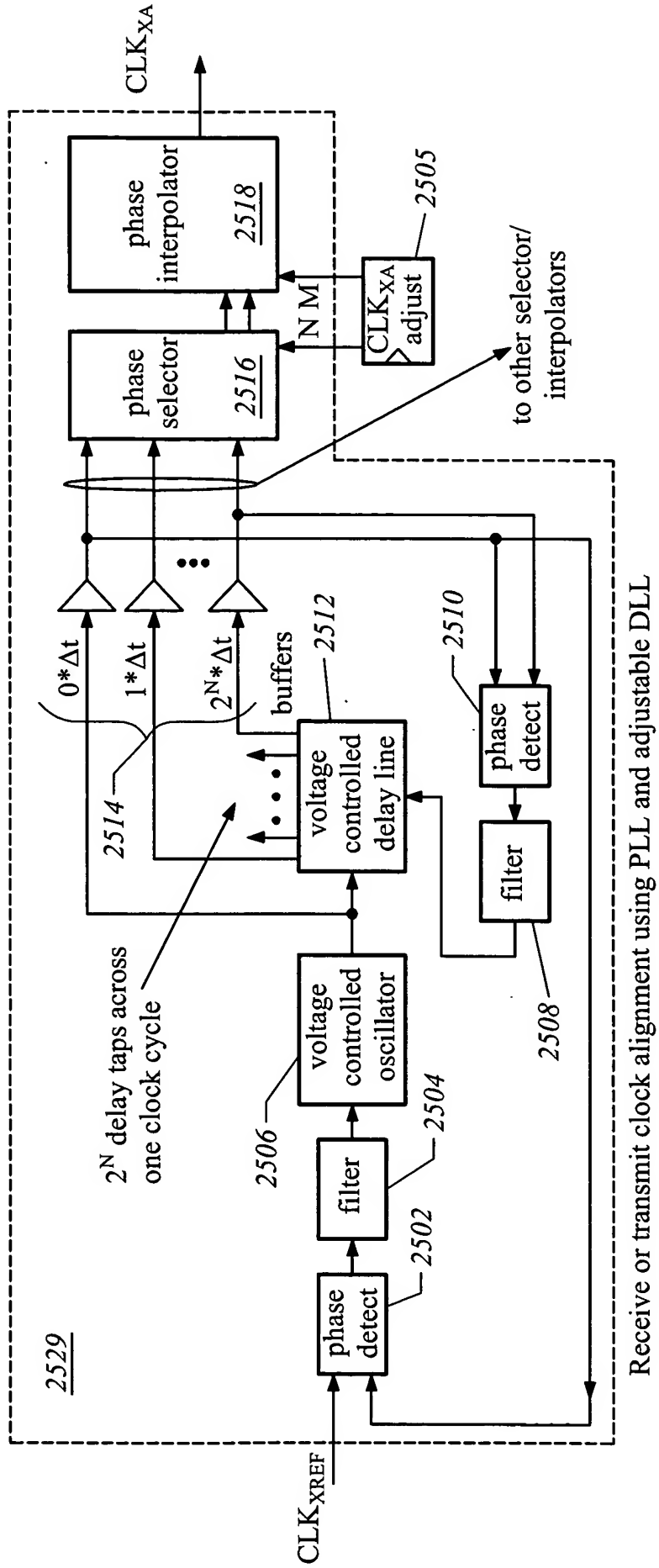
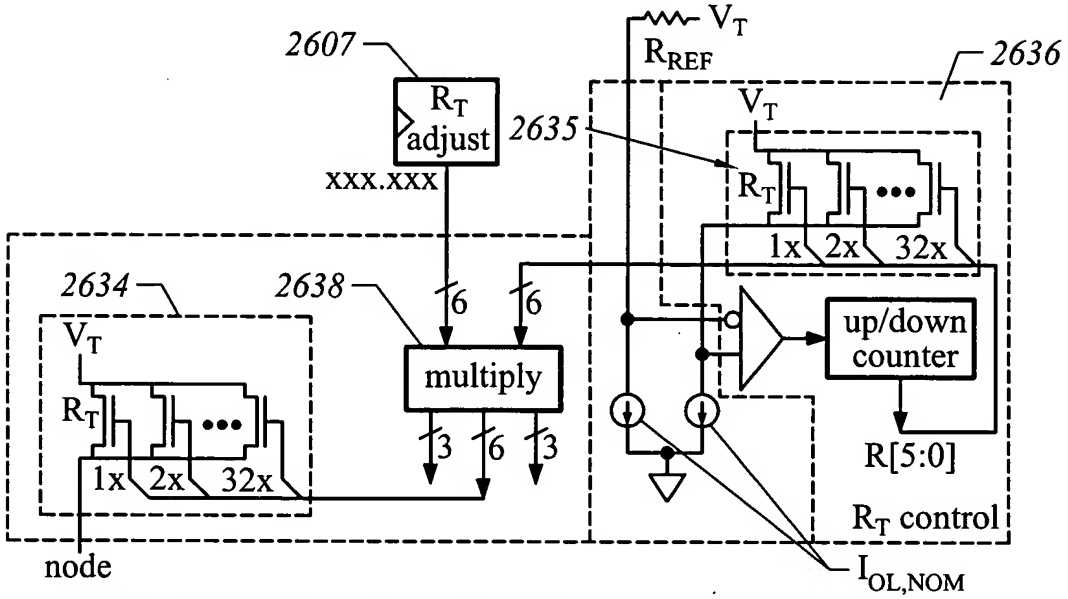


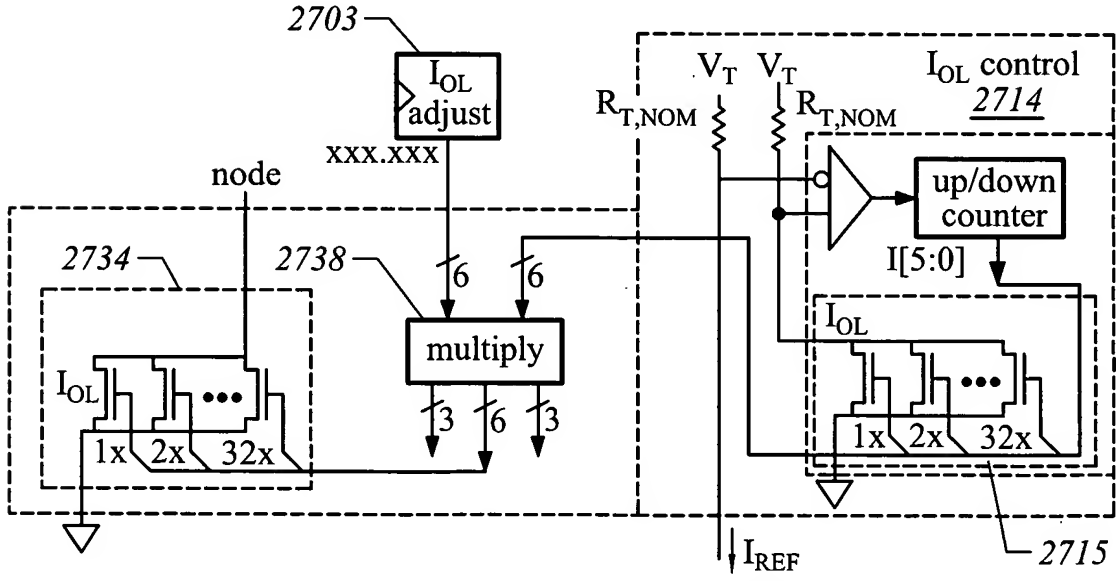
FIG. 25

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US



Adjustable termination with calibration to reference value

FIG. 26



Adjustable I_{OL} current with calibration to reference value

FIG. 27

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

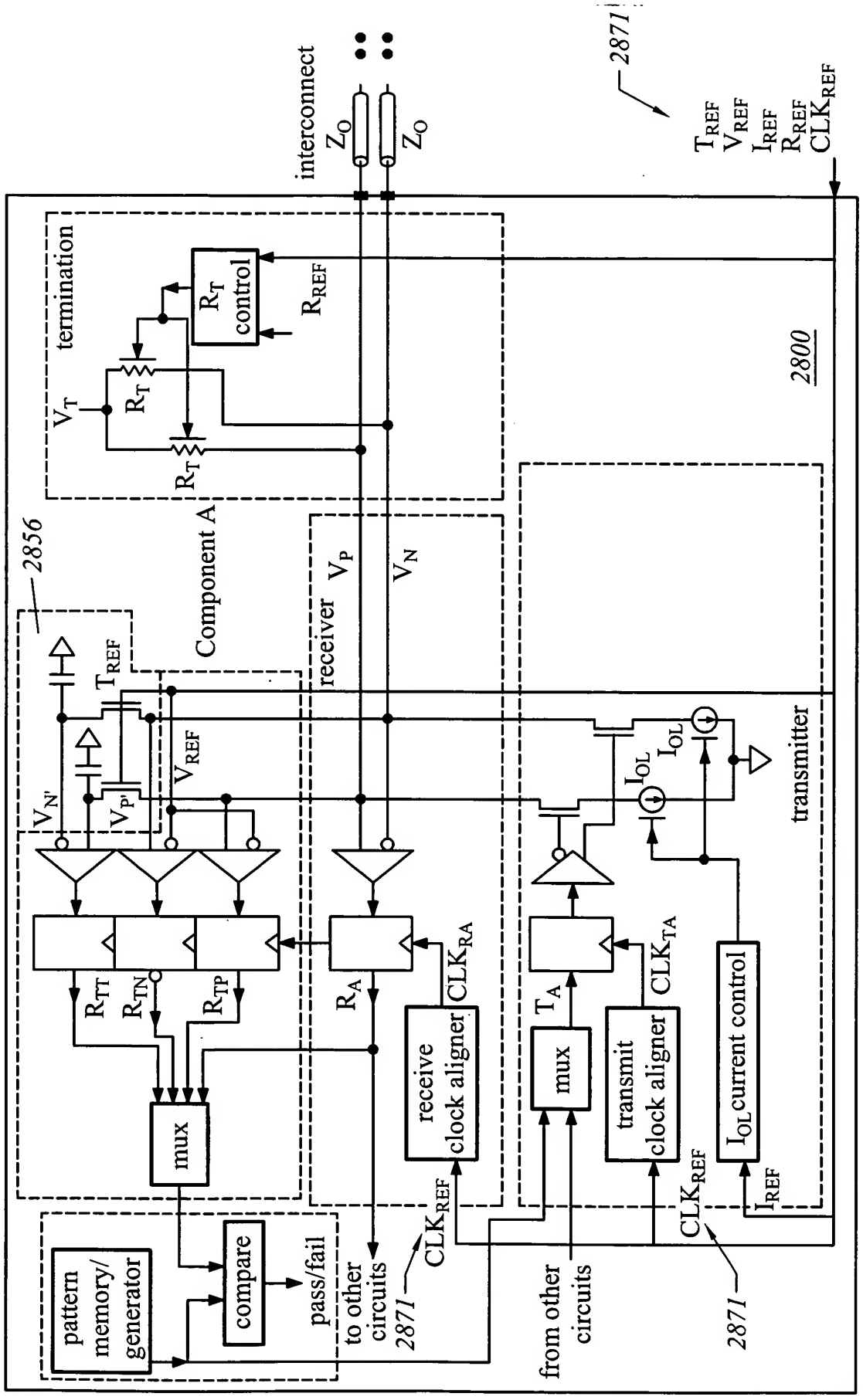


FIG. 28

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

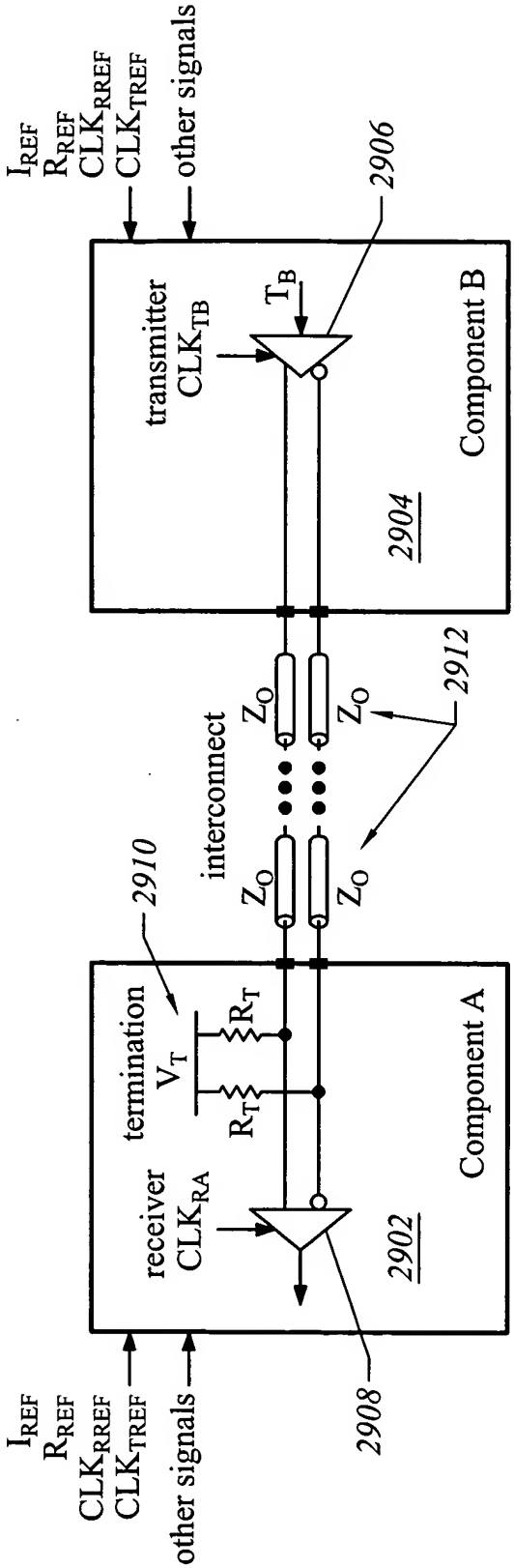


FIG. 29

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

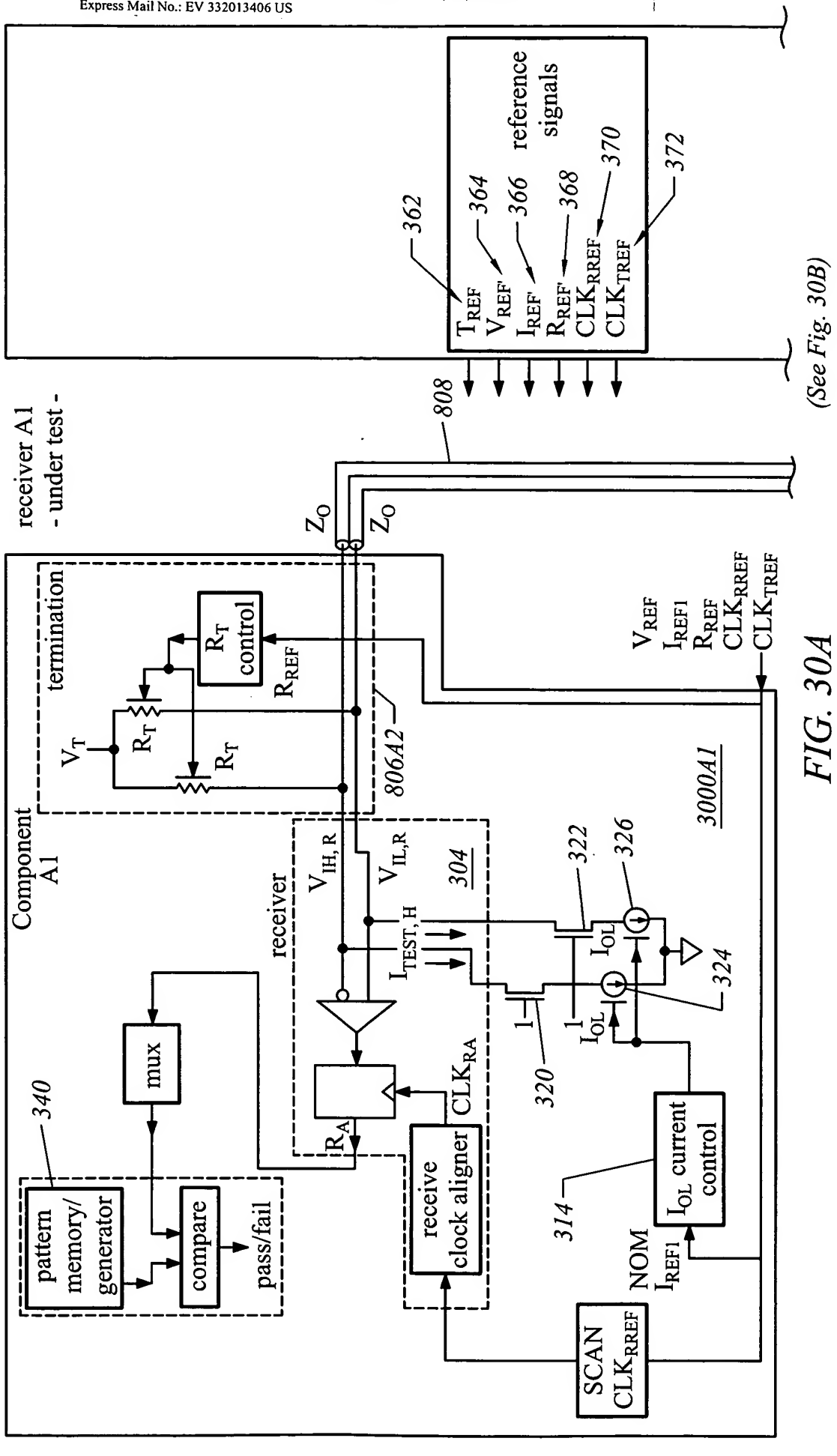


FIG. 30A

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

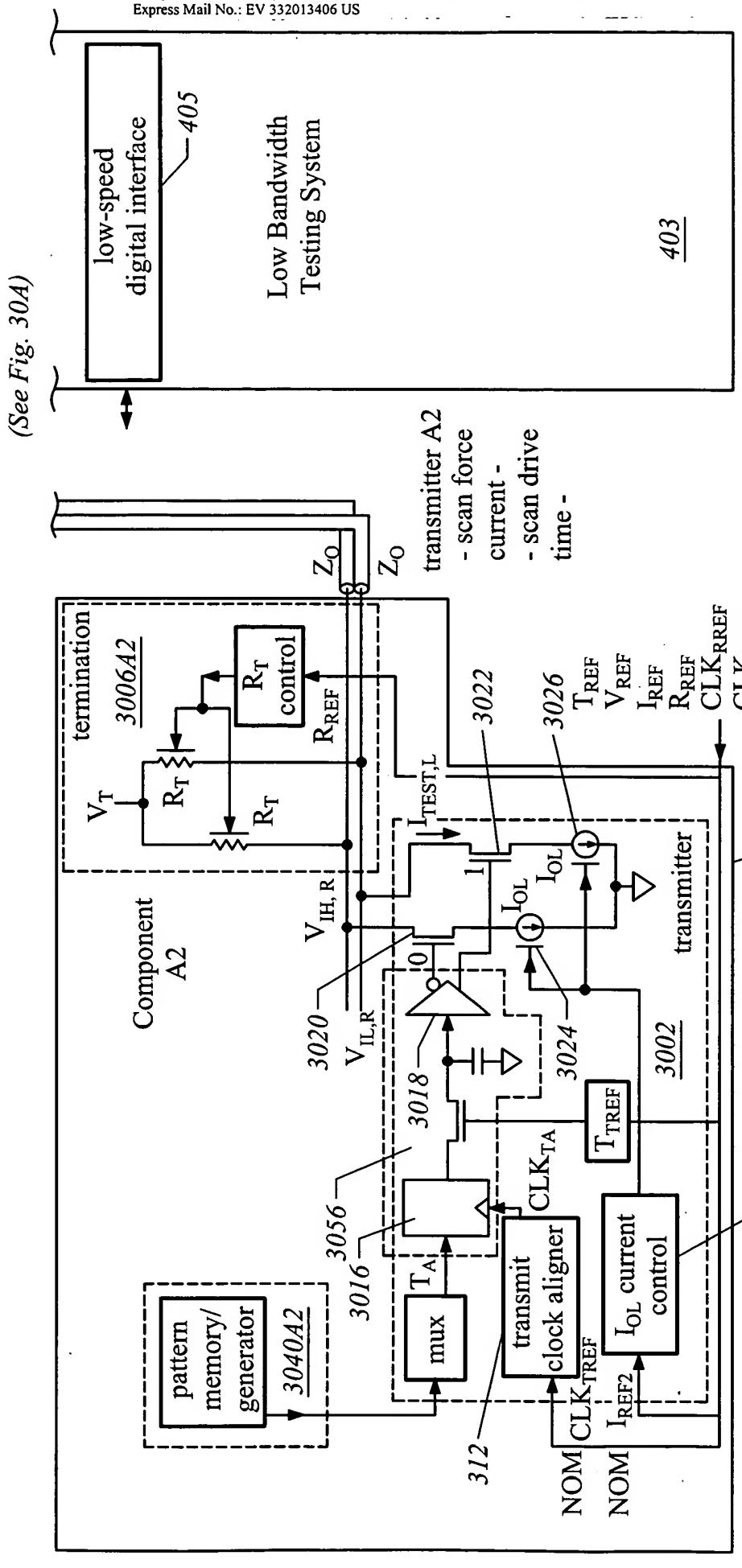
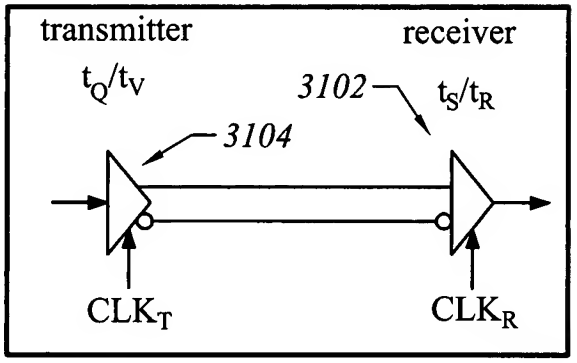


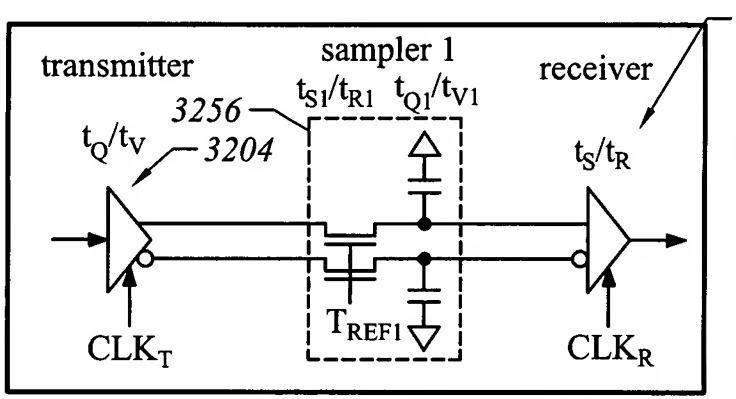
FIG. 30B

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US



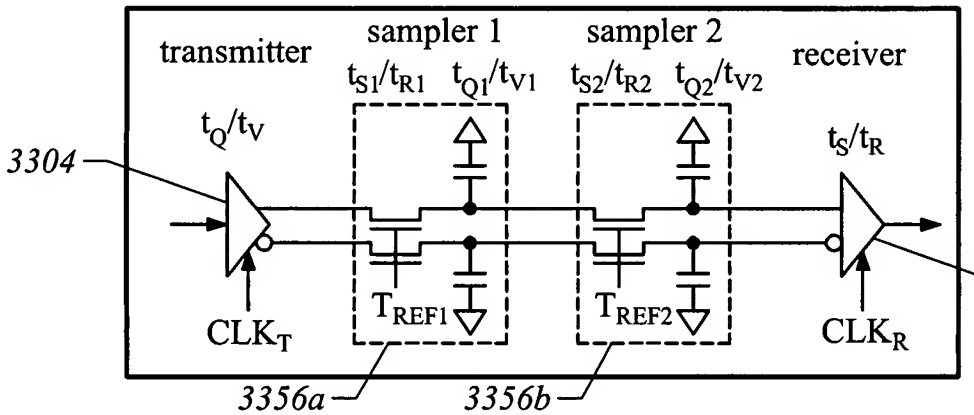
$t_S + t_Q = k1$ $t_V - t_H = k2$ transmitter => receiver

FIG. 31



$t_S + t_Q = k1$ $t_V - t_H = k2$ transmitter => receiver
$t_{S1} + t_Q = k3$ $t_V - t_{H1} = k4$ transmitter => sampler 1
$t_S + t_{Q1} = k7$ $t_{V1} - t_H = k8$ sampler 1 => receiver

FIG. 32



$t_S + t_Q = k1$	$t_V - t_H = k2$	transmitter => receiver
$t_{S1} + t_Q = k3$	$t_V - t_{H1} = k4$	transmitter => sampler 1
$t_{S2} + t_{Q1} = k5$	$t_{V1} - t_{H2} = k6$	sampler 1 => sampler 2
$t_S + t_{Q2} = k7$	$t_{V2} - t_H = k8$	sampler 2 => receiver

FIG. 33

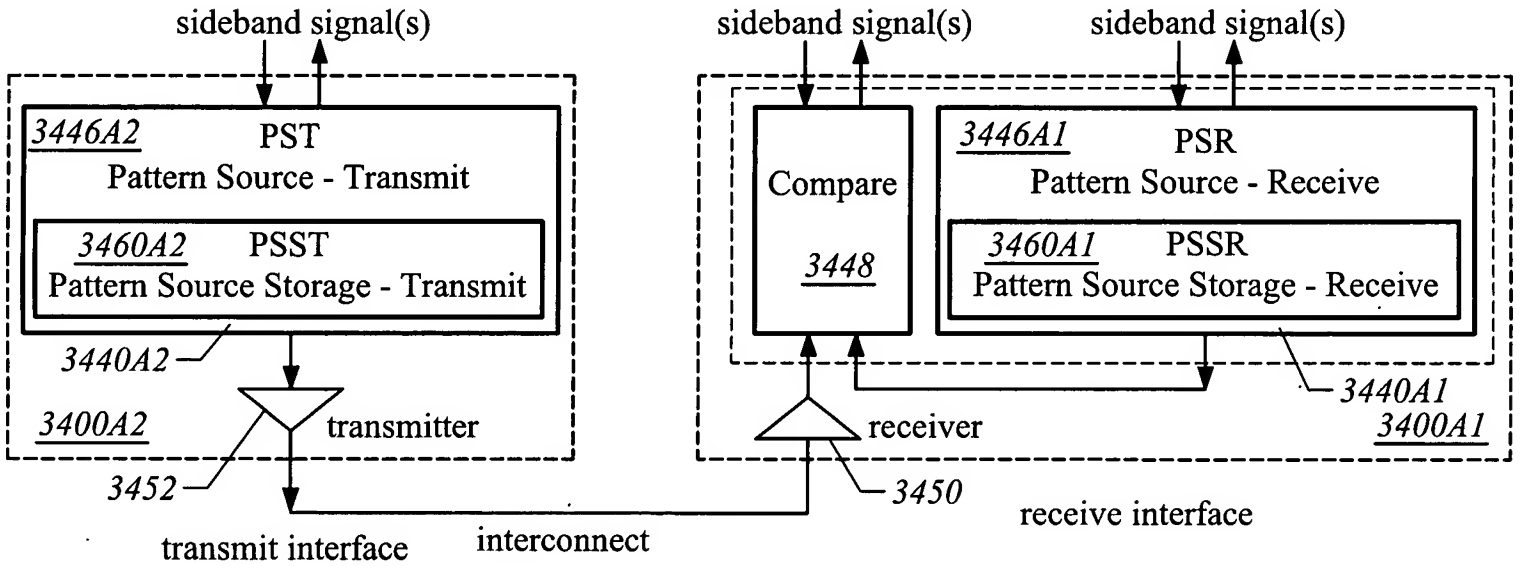


FIG. 34

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al.
Appl. No.: Unknown
Filing Date: January 30, 2004
Express Mail No.: EV 332013406 US
Docket: RAMB-01033US1
Atty: Kirk J. DeNino, Esq.
Phone: (415) 369-9660

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

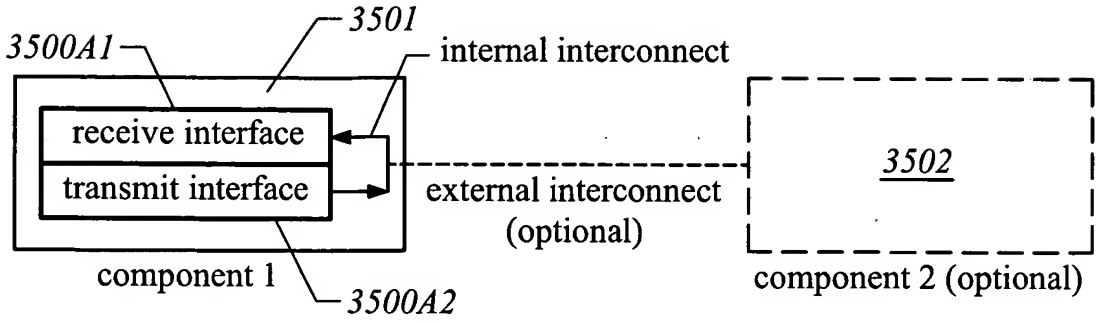


FIG. 35A

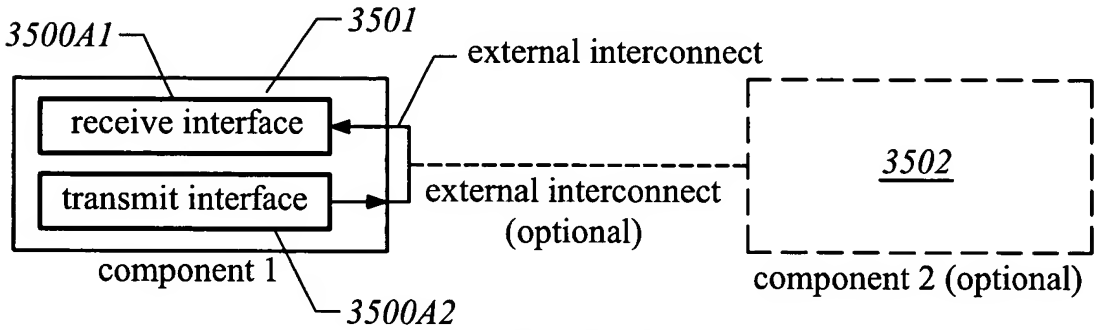


FIG. 35B

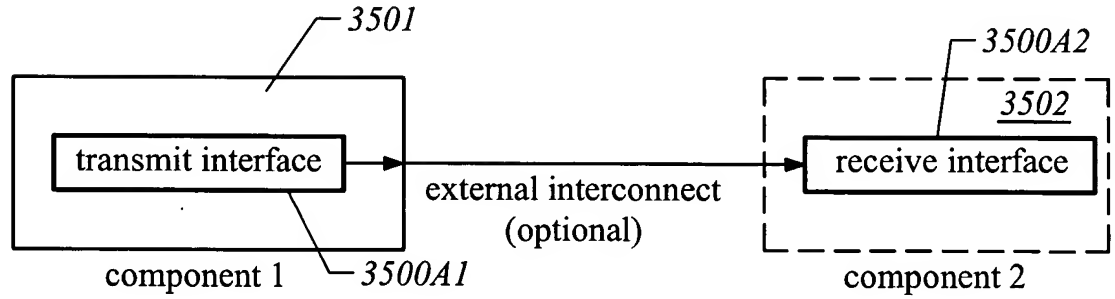


FIG. 35C

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

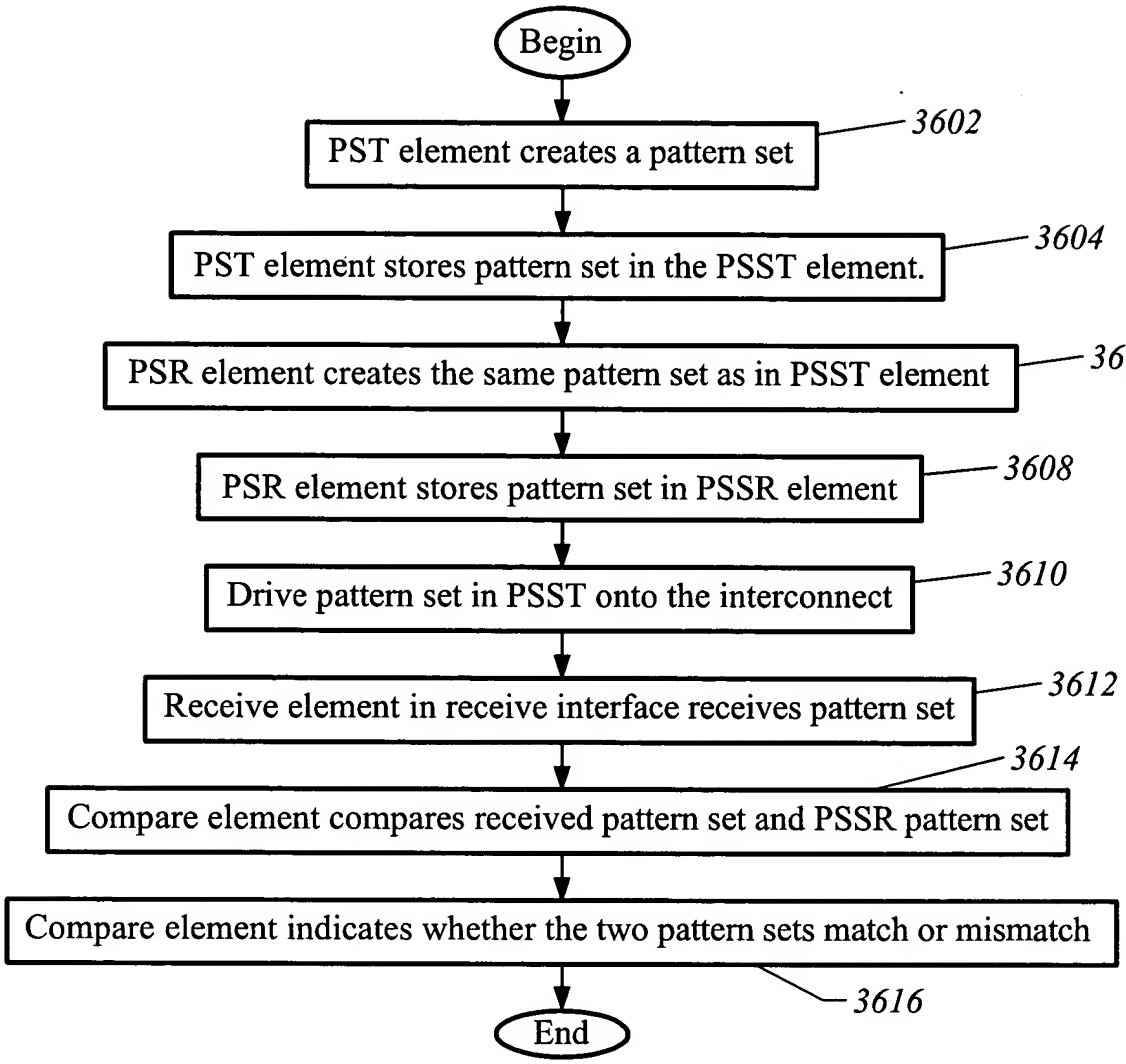


FIG. 36

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

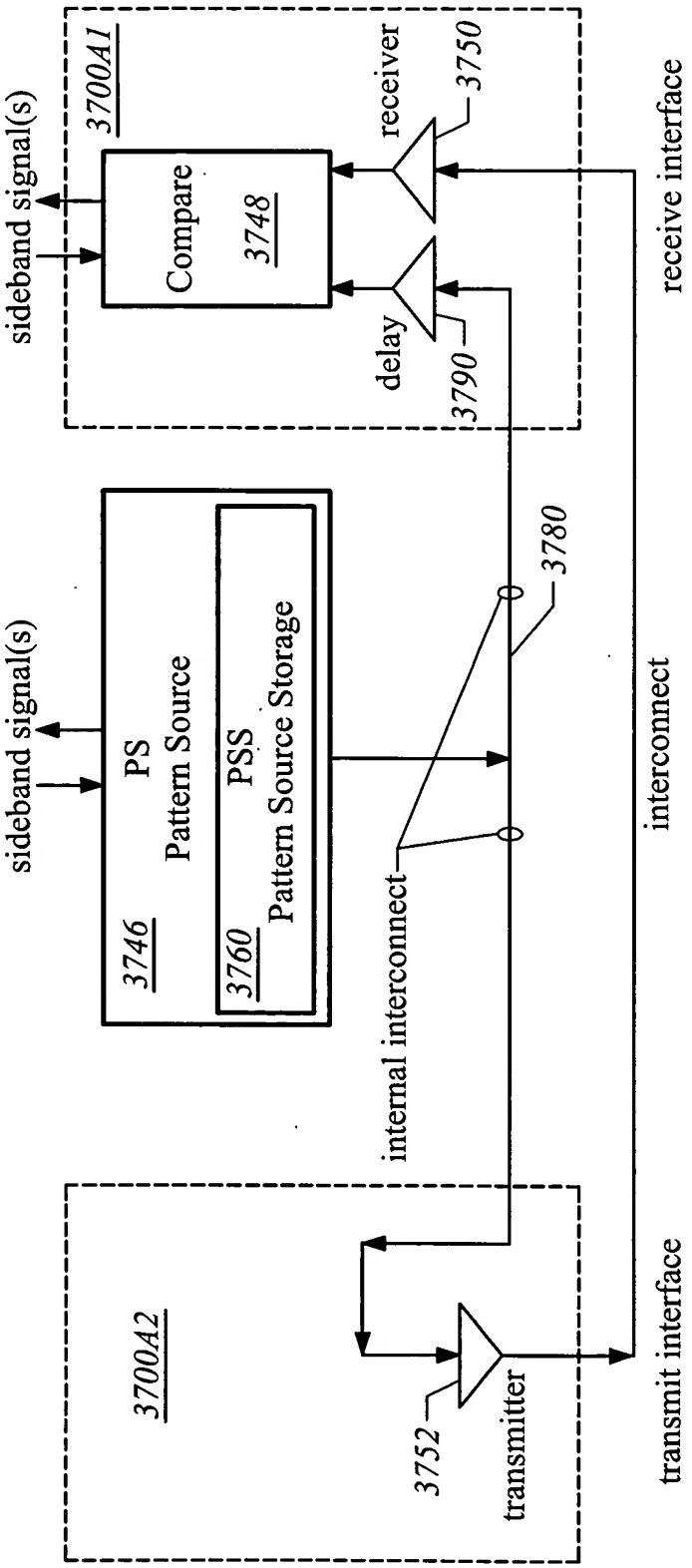


FIG. 37

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

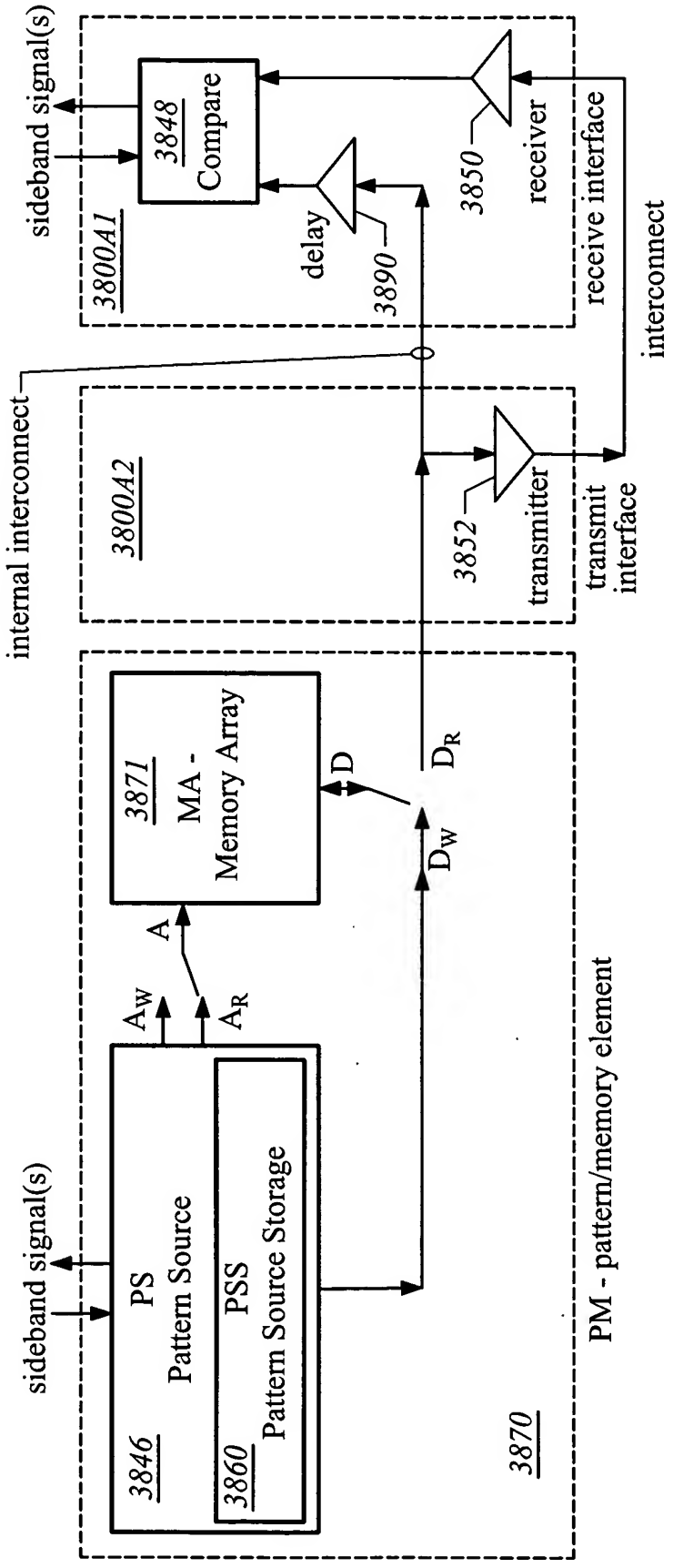


FIG. 38

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

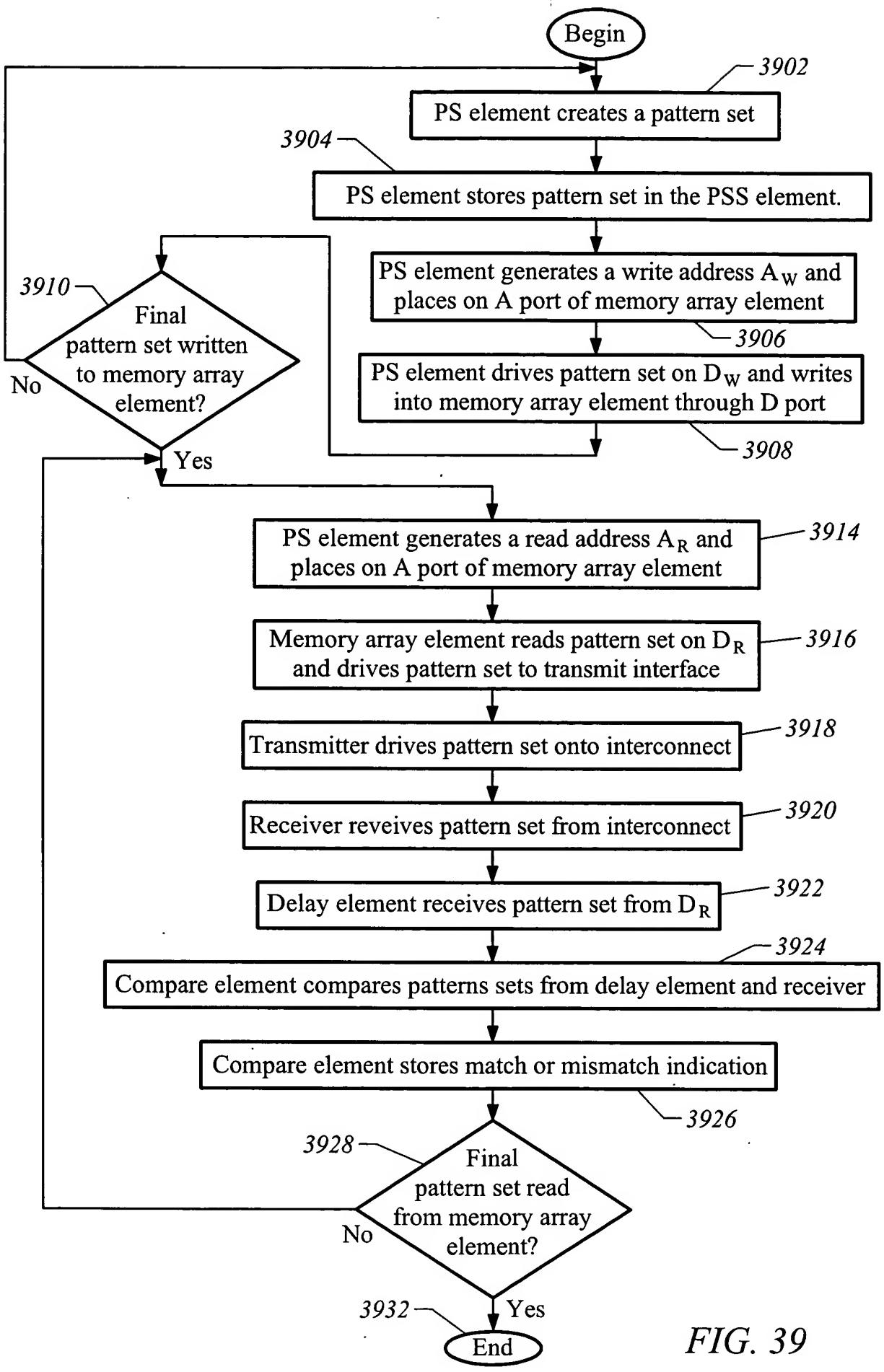


FIG. 39

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

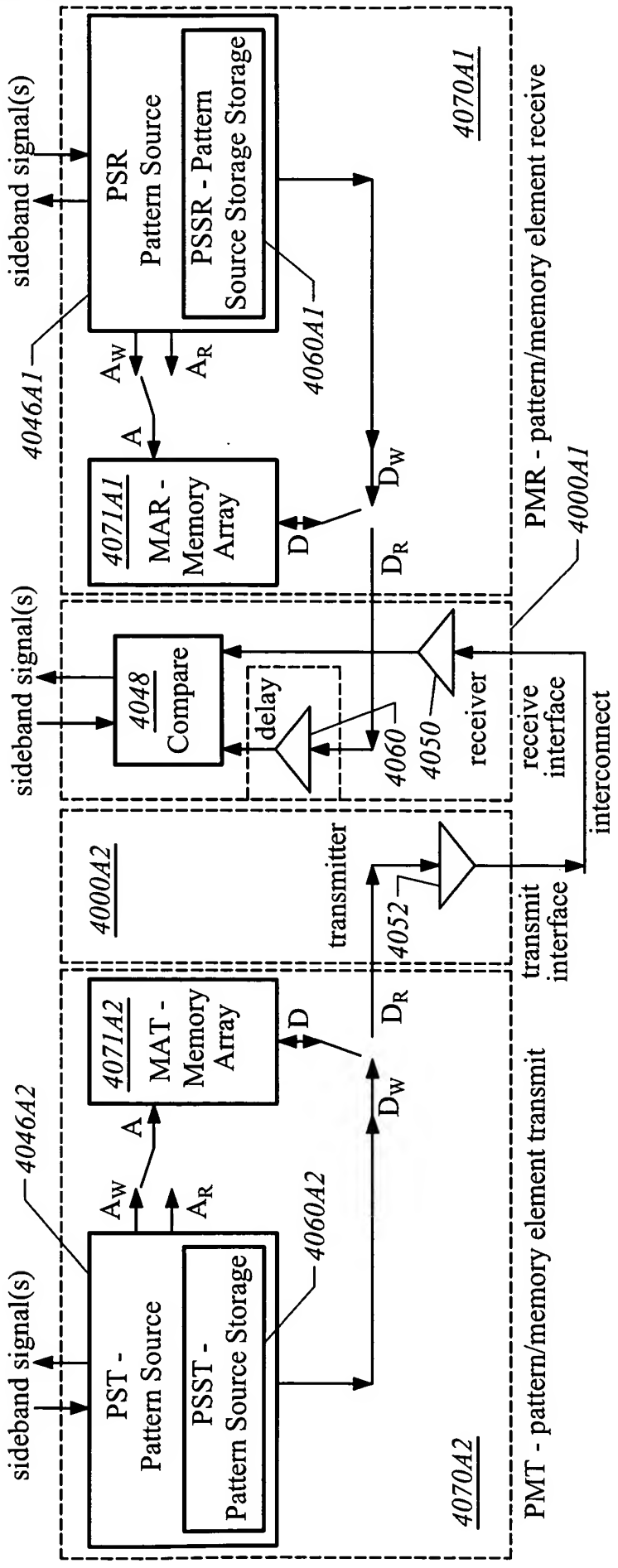


FIG. 40

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

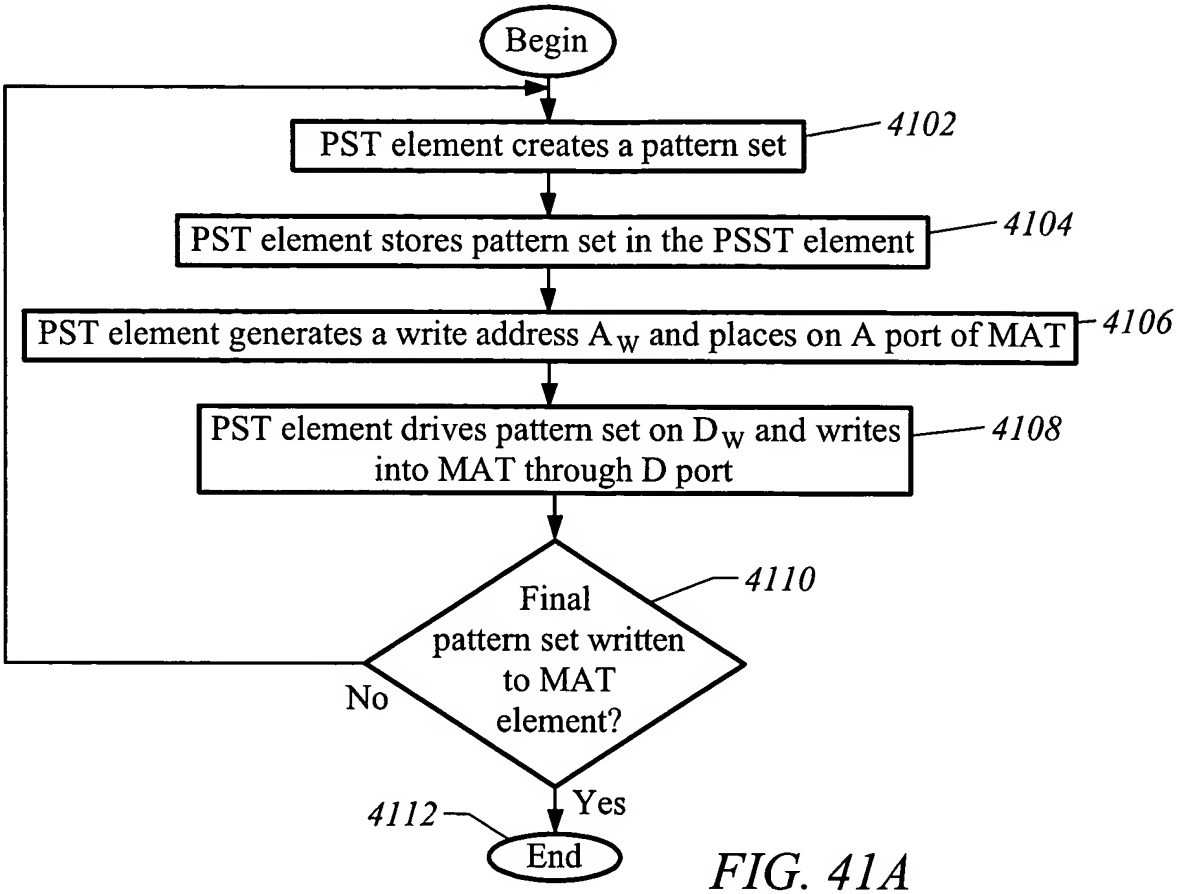


FIG. 41A

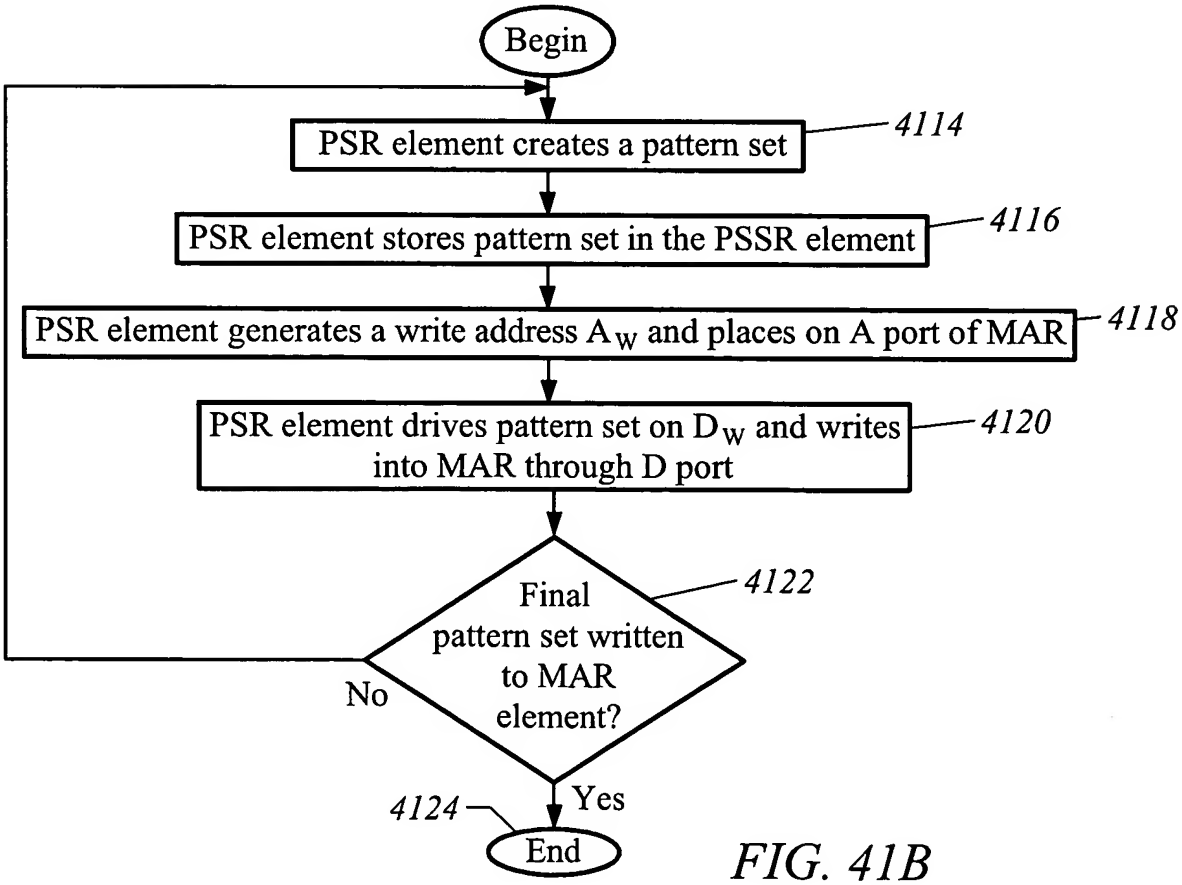


FIG. 41B

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

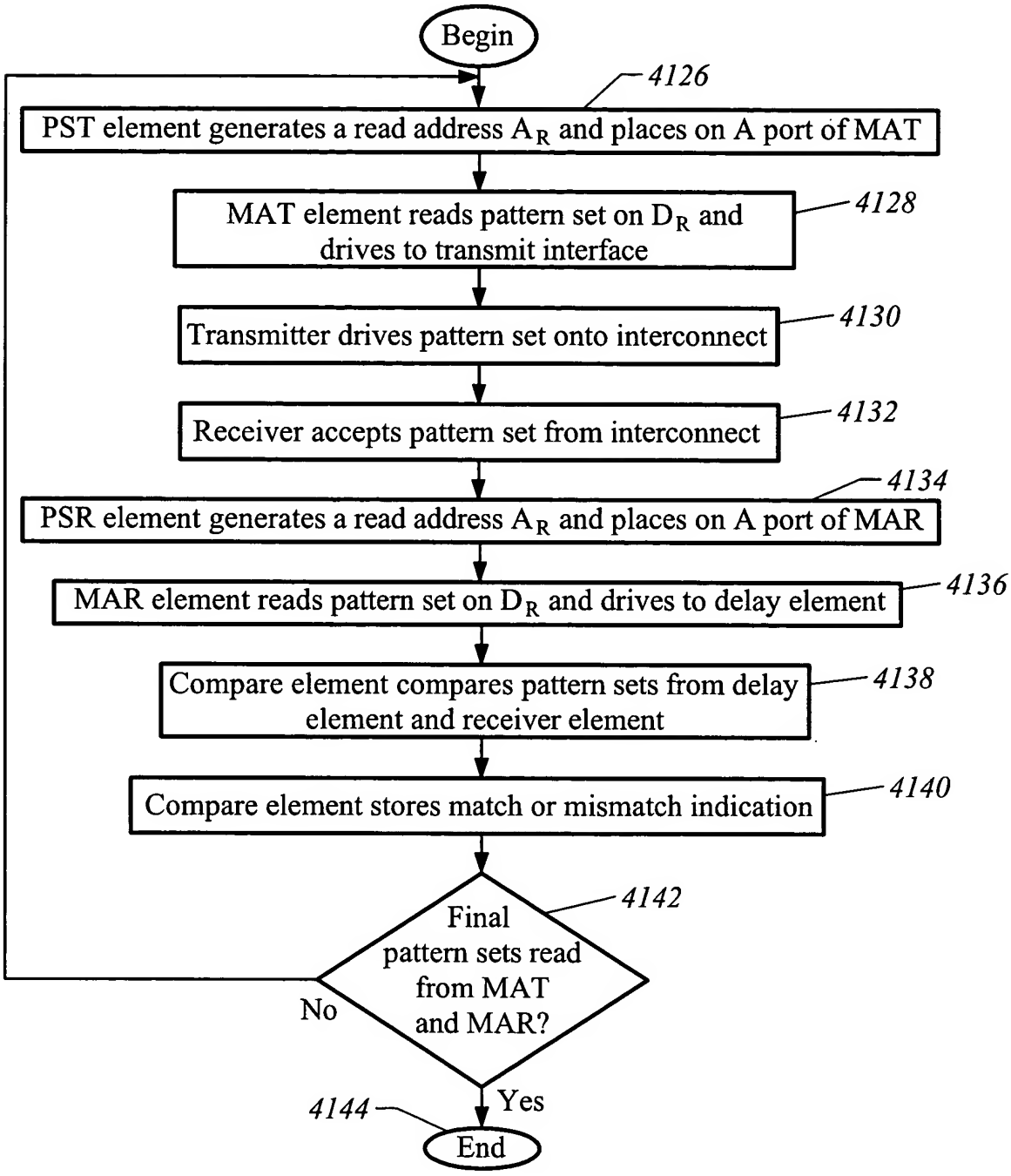


FIG. 41C

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

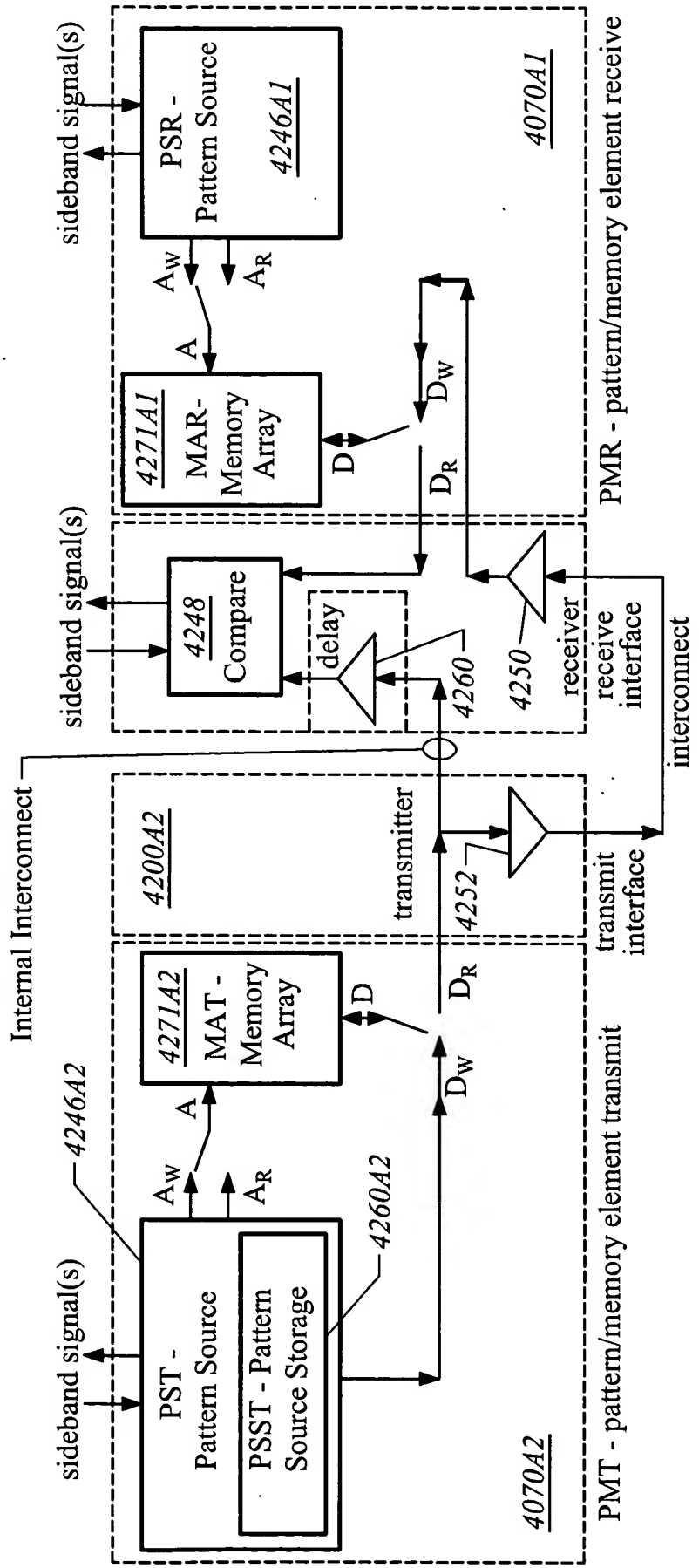


FIG. 42

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

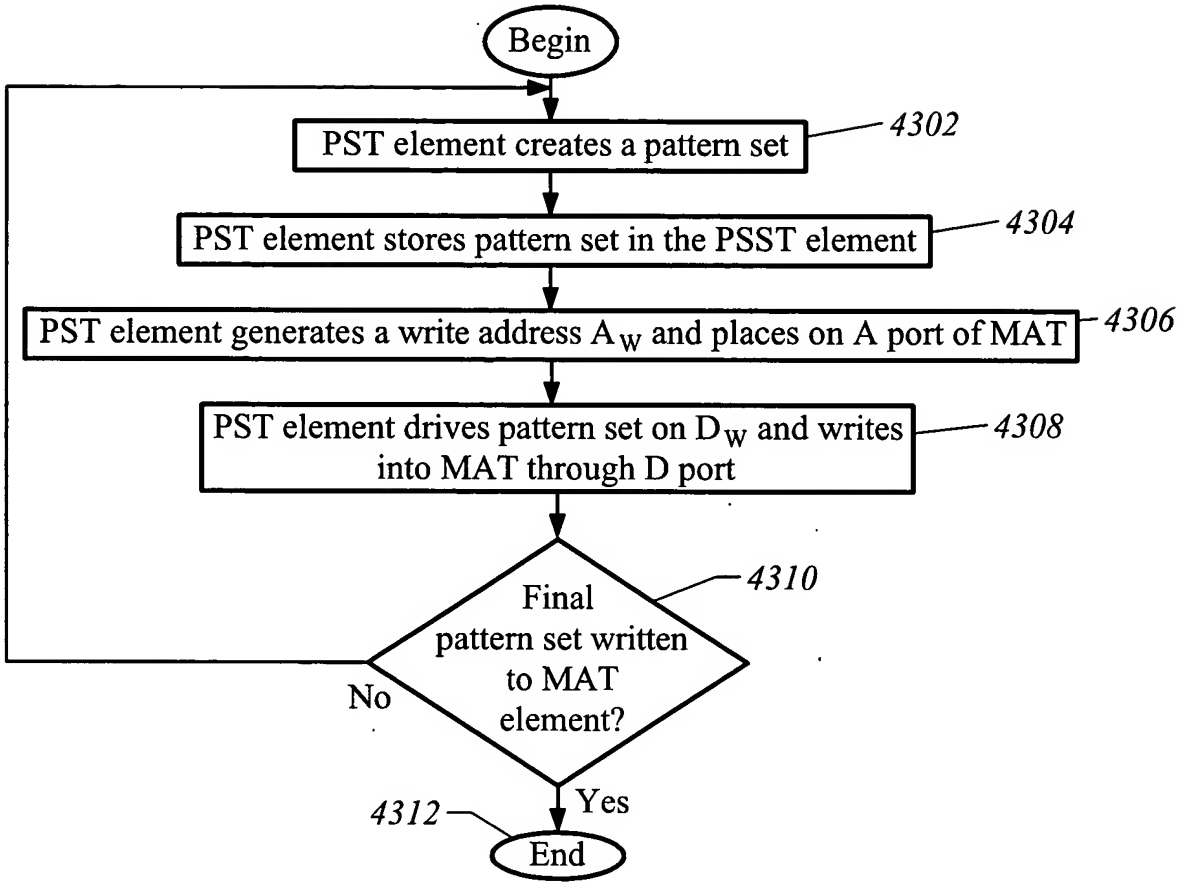


FIG. 43A

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

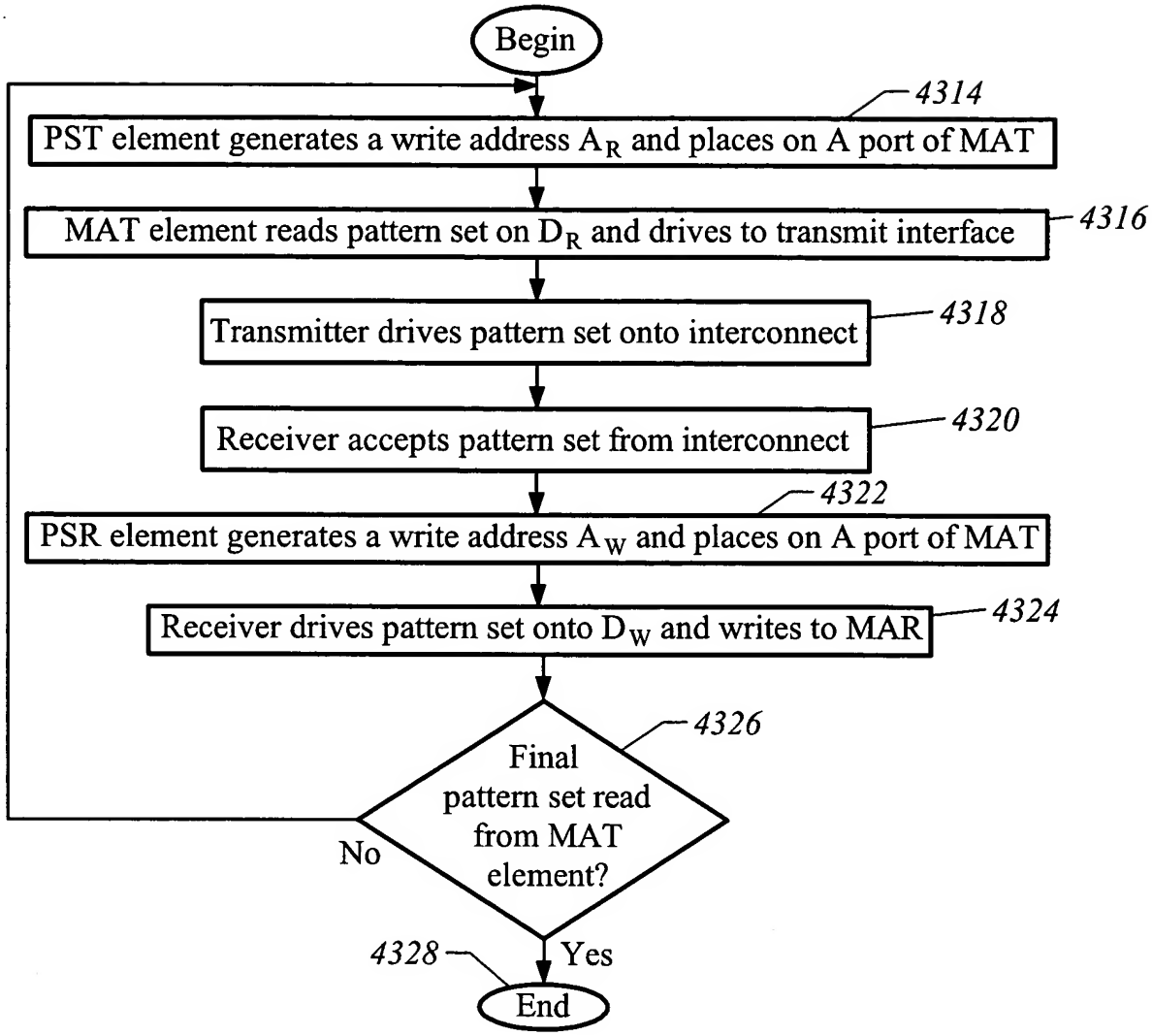


FIG. 43B

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

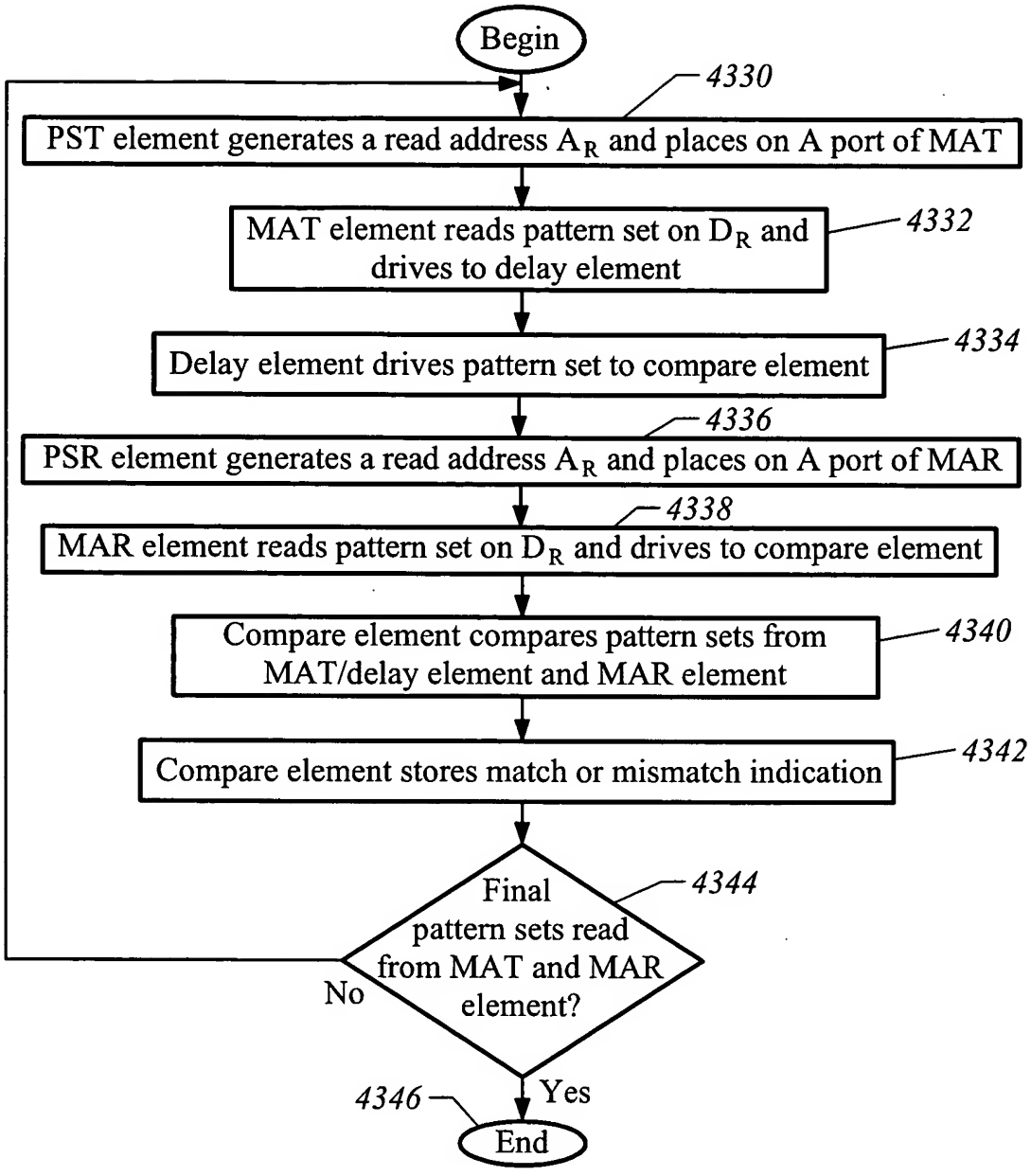


FIG. 43C

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

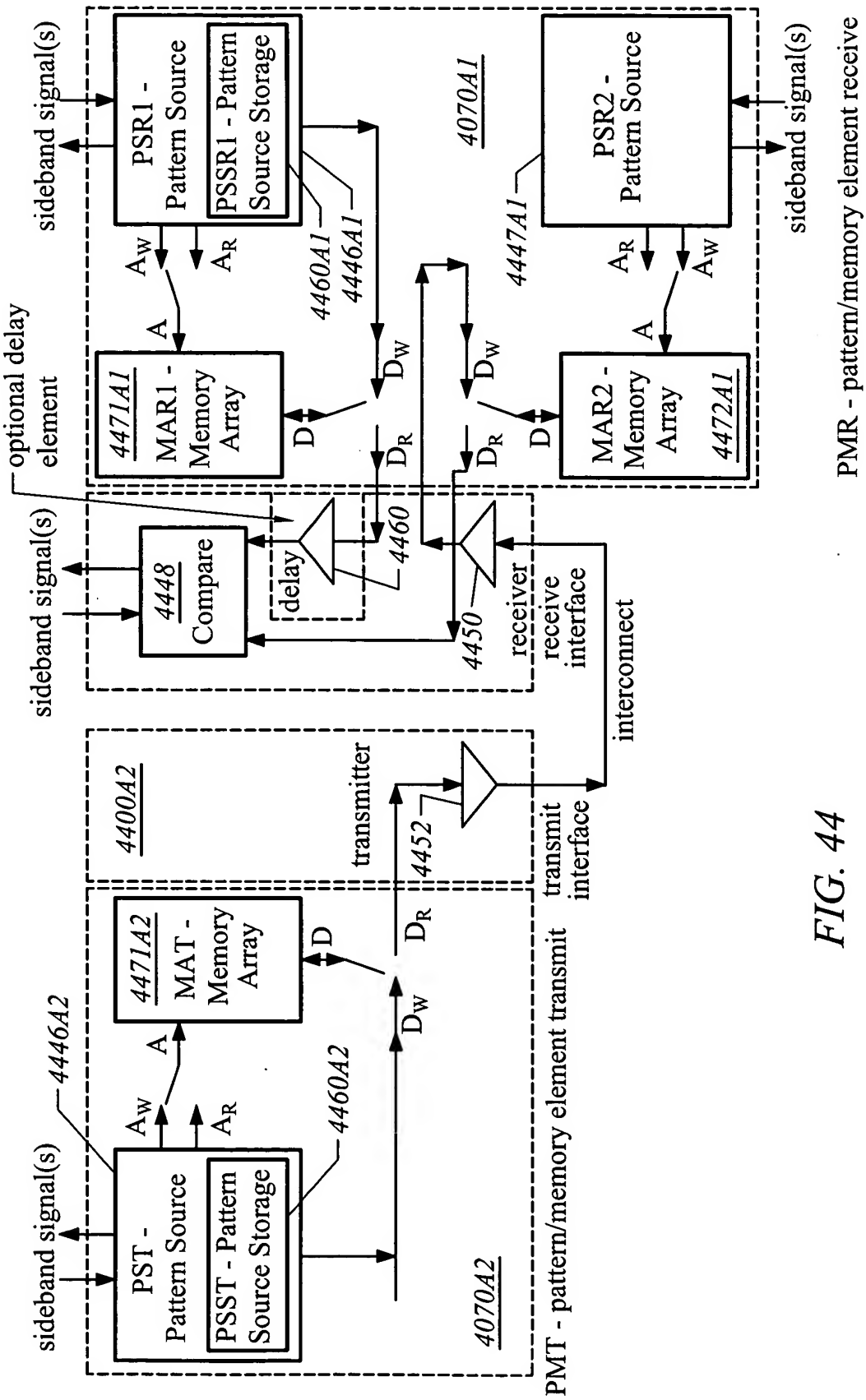


FIG. 44

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

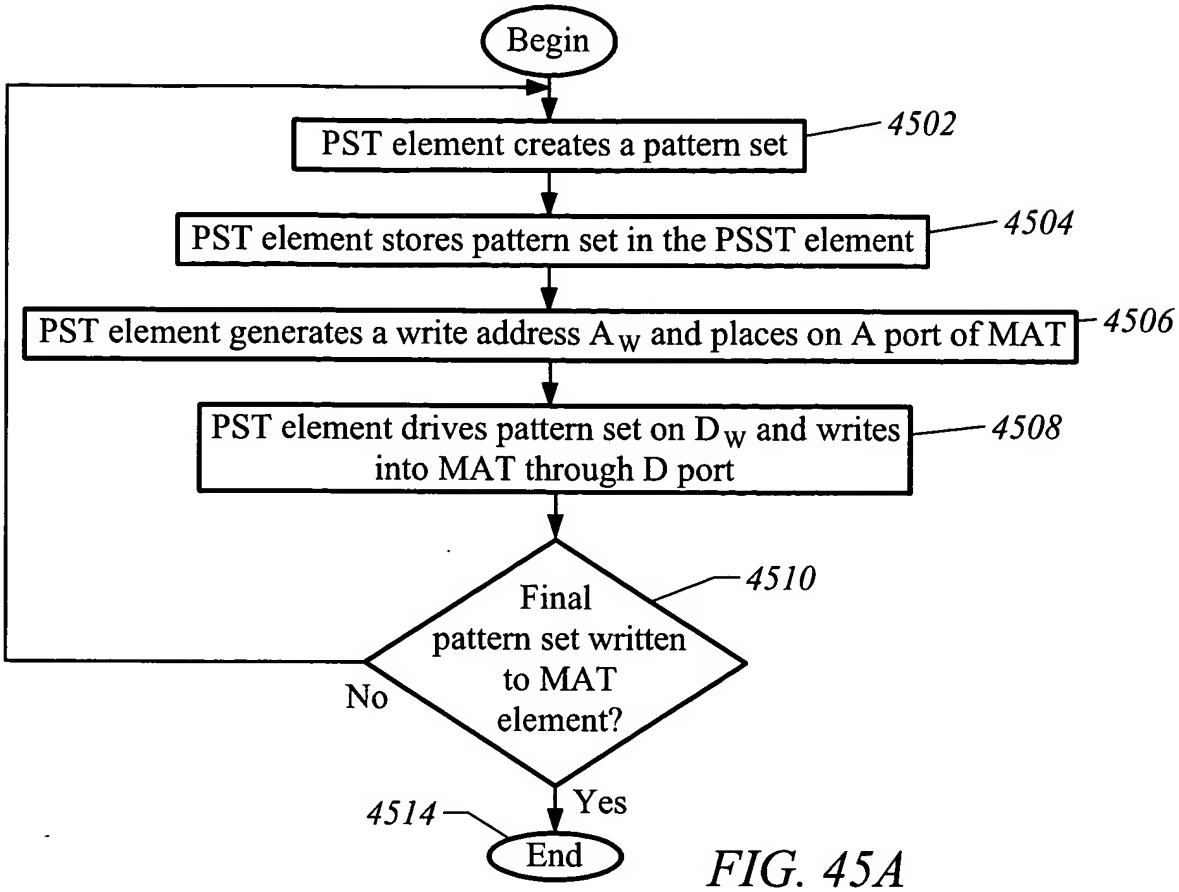


FIG. 45A

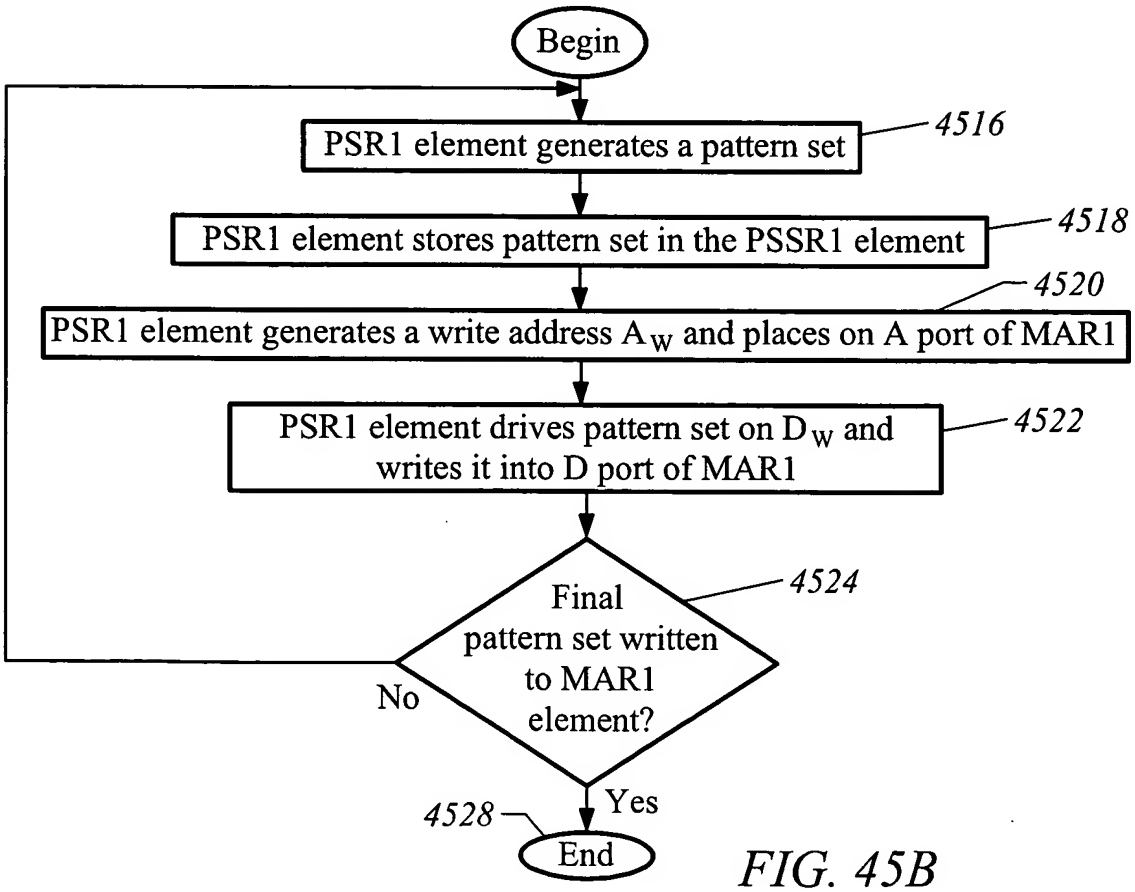


FIG. 45B

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

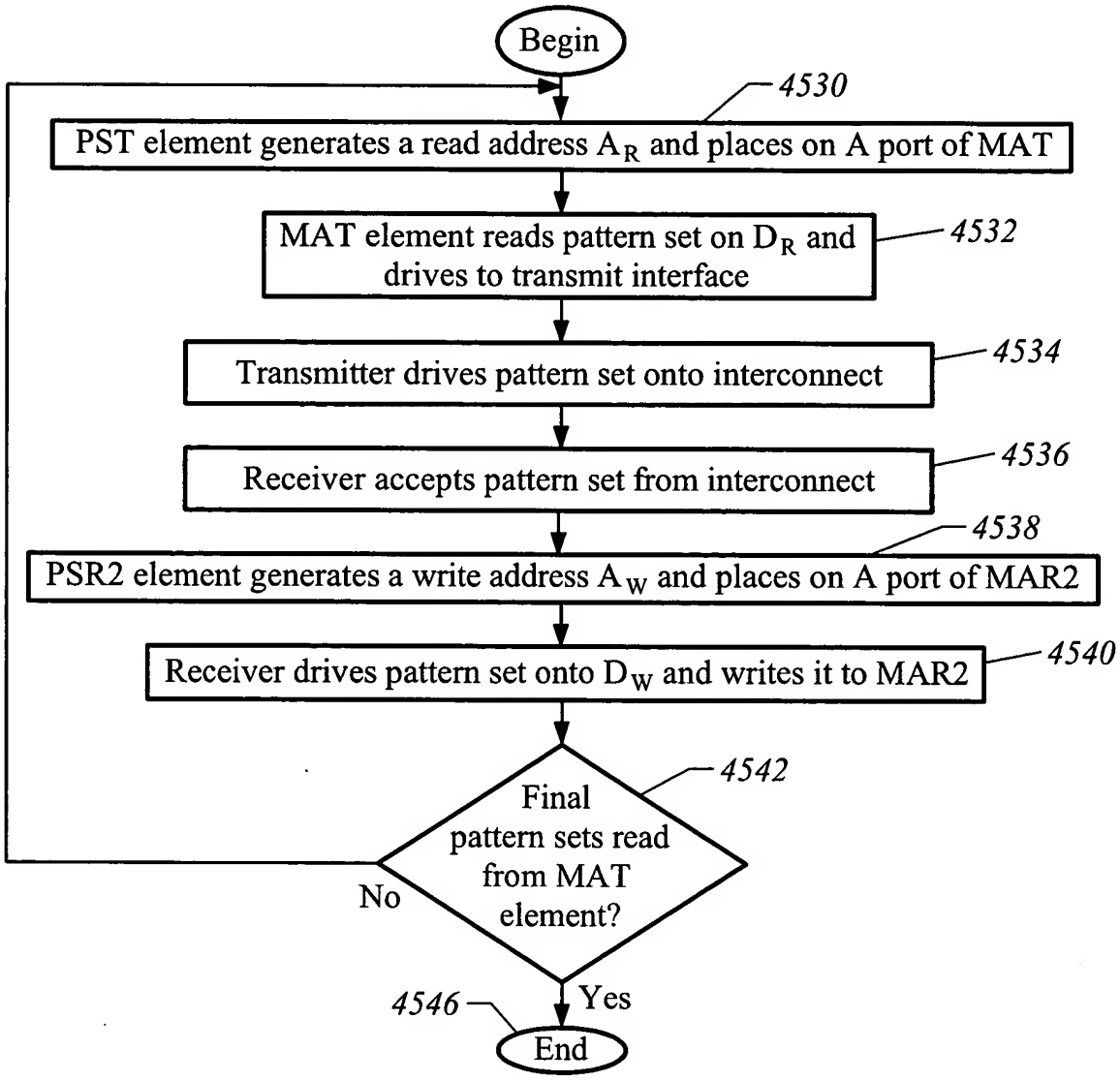


FIG. 45C

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

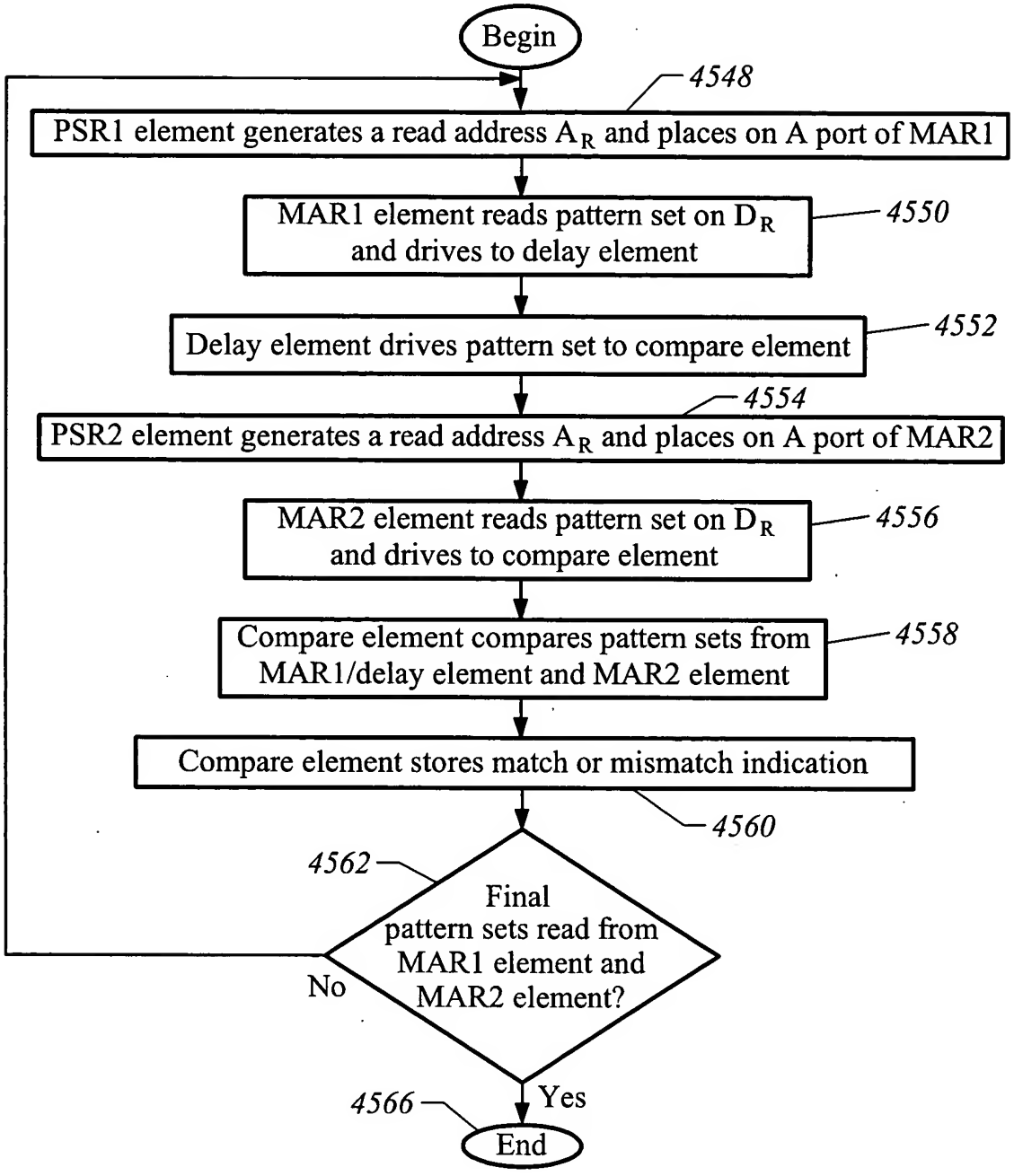


FIG. 45D

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

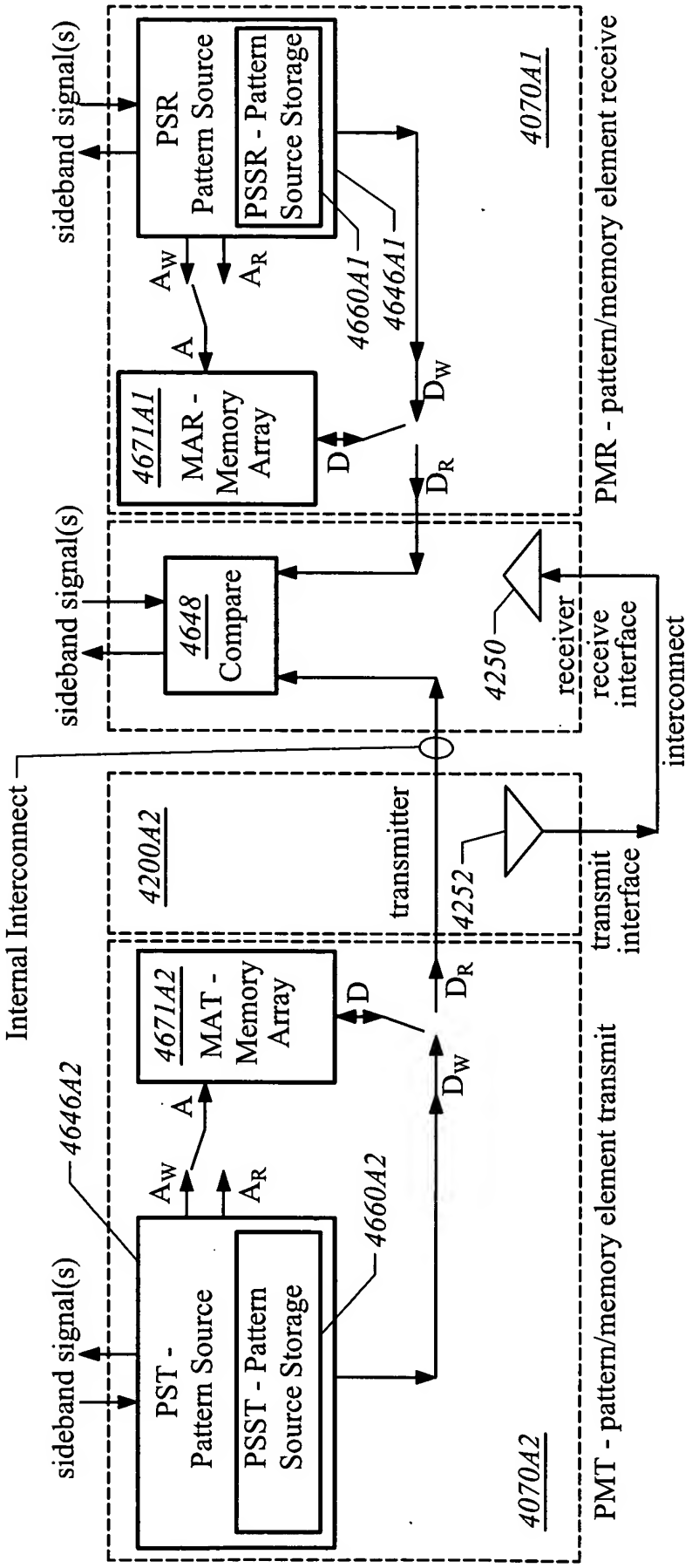


FIG. 46

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

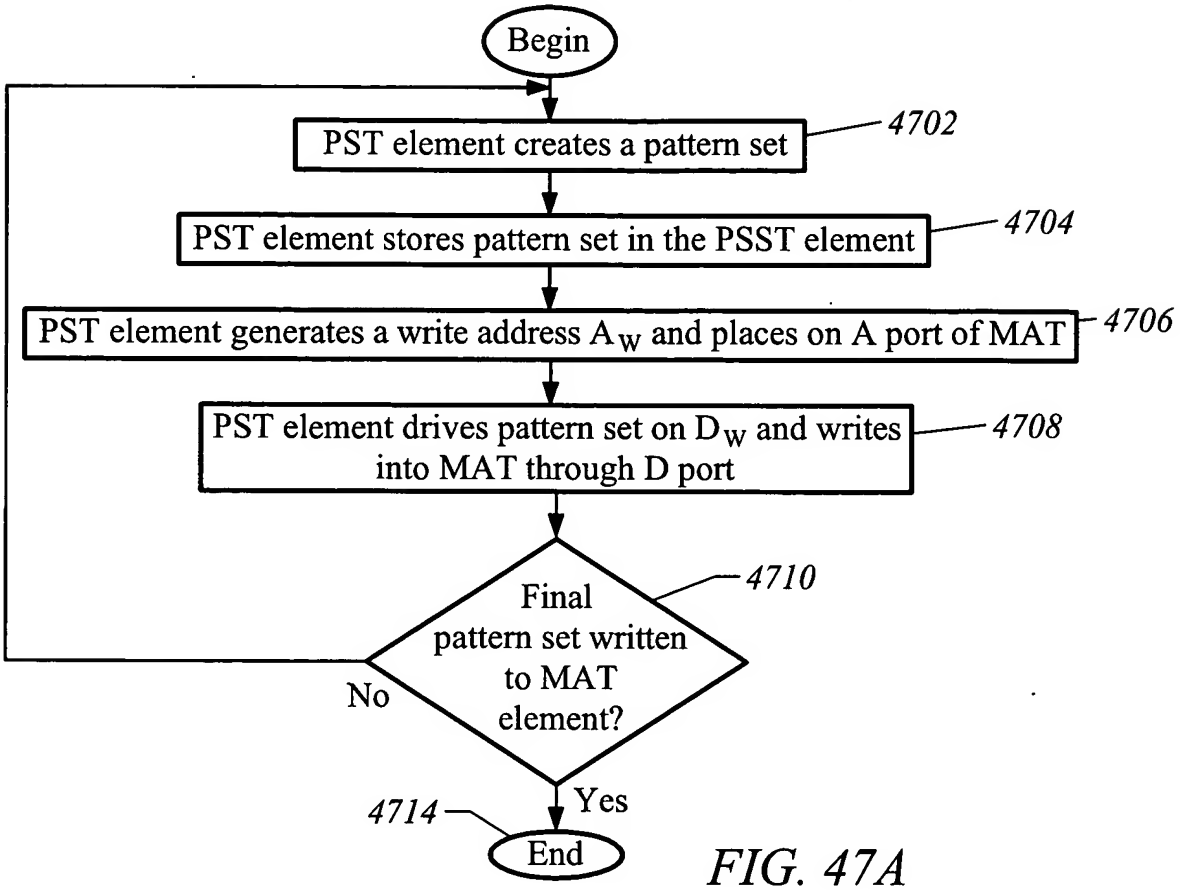


FIG. 47A

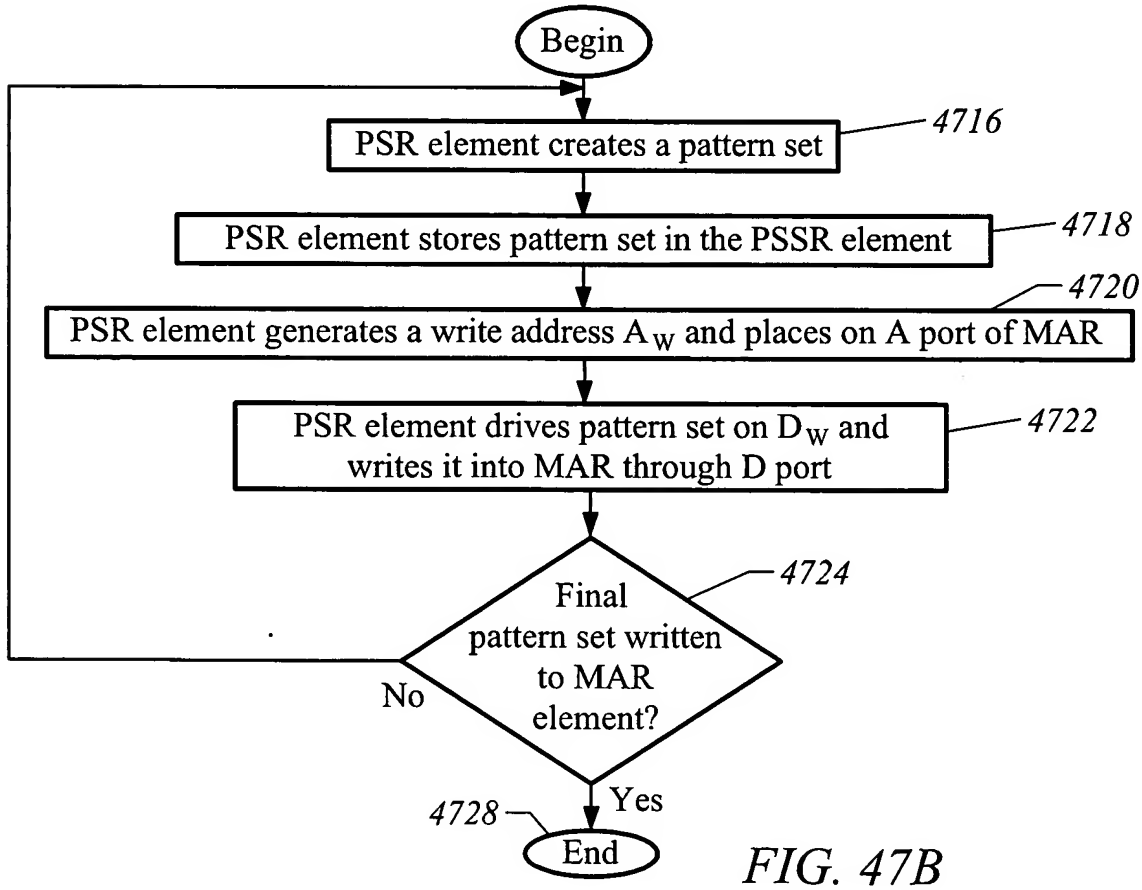


FIG. 47B

Title: Method And Apparatus For Test And Characterization Of Semiconductor Components
Applicants: Ware et al. Docket: RAMB-01033US1
Appl. No.: Unknown Atty: Kirk J. DeNiro, Esq.
Filing Date: January 30, 2004 Phone: (415) 369-9660
Express Mail No.: EV 332013406 US

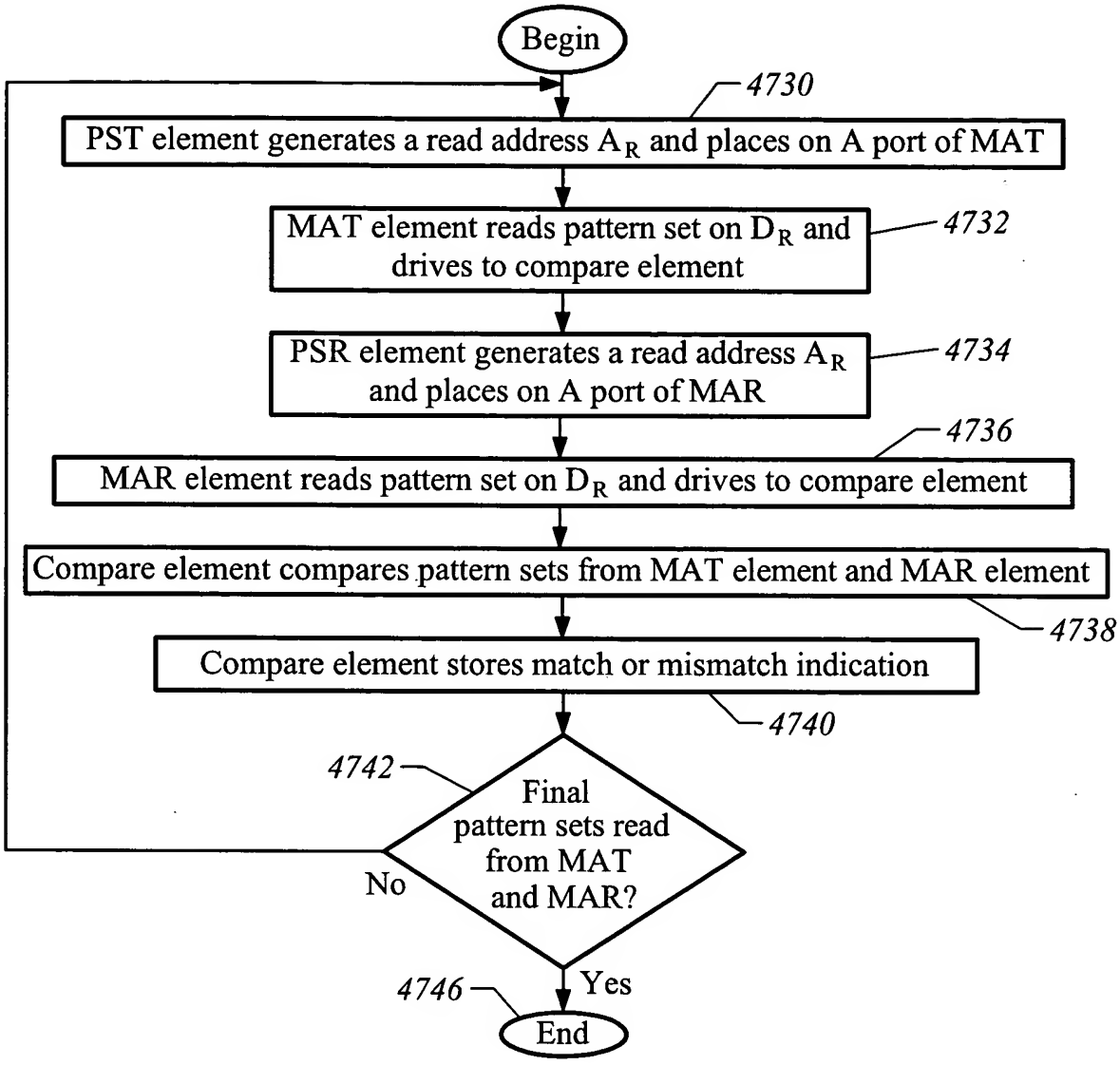


FIG. 47C